the OIL AND GAS JOURNAL

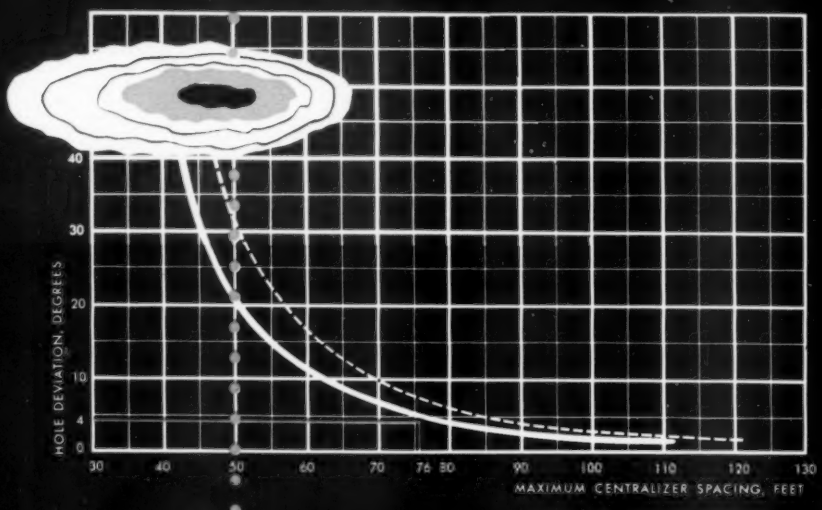
Tapered Roller
TIMKEN BEARING
EQUIPPED

This symbol on a product means its bearings are the best

THE TIMKEN ROLLER BEARING COMPANY • CANTON 6, OHIO, CABLE ADDRESS: "TIMROSCO"

PRICE 50 CENTS TABLE OF CONTENTS PAGE 91 **AUGUST 16, 1951**

JUST ONE SIZE HALLIBURTON CENTRALIZER FOR ALL COMMON HOLE SIZES!



HALLIBURTON S-3 CENTRALIZERS

HALLIBURTON S-3 CENTRALIZERS simplify ordering and warehousing because only one size is required for each casing O.D. size. In addition to this saving, exhaustive permanent-set and load-deflection tests have proved HALLIBURTON S-3 CENTRALIZERS to have less loss of bowed-height and greater effective centering force than any other centralizer on the market. HALLIBURTON has prepared a complete set of maximum spacing charts showing maximum spacing between centralizers at various hole deviations up to 50°, for all common hole sizes. They're Free . . . Ask for your copy today.

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HALLIBURTON OIL WELL CEMENTING CO.

DUNCAN, OKLAHOMA

SPEED UP HANDLING JOBS

with Bethlehem Braided Slings

If some of your lifting and moving jobs are crying for faster action, Bethlehem strongly suggests that you consider braided slings.

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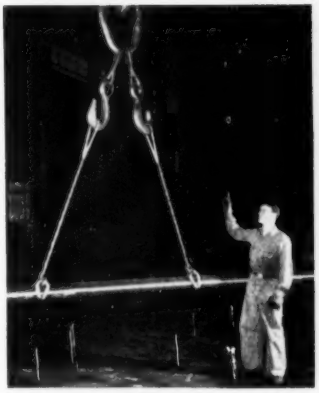
Of course, the braided sling is but one of the many choices that Bethlehem makes available. If you feel that your needs are better served by a nonbraided type—either standard or special—our plant can readily handle your order to specifications. Remember: we are fully set up to furnish *every* class of sling, and our designing and manufacturing units are unsurpassed anywhere in the country.

Here's a suggestion: send us your prints, drawings, or sketches showing the kind of handling problem you have in mind. Braided slings may well be the answer; but if another type seems more logical for your application, we'll tell you so frankly. Before you take this step, however, you may prefer to look over our slings catalog. Ask for a free copy; it will be mailed promptly.



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The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910 at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951

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You get MORE CAPACITY with a FANMIX BURNER

Increase Boiler Ratings On Present Or Planned Equipment

In all types of Coppus-Dennis FANMIX Burners — straight gas or combination gas-oil — we utilize the energy of the fuel under pressure to drive the burner fan and deliver air in the proper proportion to the fuel flow. This exclusive "pinwheel action" *mechanically* mixes fuel and air in exactly the right proportions for truly radiant, non-luminous heat.

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FANMIX can easily be operated with your present furnace and stack, requiring only minor changes in other equipment. Or if you're planning on new boilers, remember that FANMIX relieves the furnace from the burden of mixing, creates its own forced draft and takes smaller pipe sizes. Which means you can plan on reduced combustion space, less stack, no forced draft equipment and lower installation costs all around.

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Coppus engineers FANMIX Burners to meet individual requirements, providing complete control over heat pattern and combustion . . . Learn more about how "pinwheel action" can step up *your* boiler performance to peak efficiency and economy — as it is doing throughout industry. Send for Bulletin 410-6. Coppus Engineering Corp., Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, and MINING CATALOGS.

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most economically

WHY? Because every "Oilwell" Working Barrel and Traveling Valve part is precision finished to such exacting tolerances that "factory-matching" of pump parts is unnecessary. Even in the metal-to-metal Nickel-Iron models, out-of-stock replacements fit together perfectly.

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DI-HARD BARRELS are made by spinning a patented extra-hard metal, which has an extremely low coefficient of friction, inside of an alloy seamless steel tube which is then honed to specified tolerances. Application—for sand-laden and severely-corrosive fluids.

NICKEL-IRON BARRELS are bored from solid castings of fine-grain nickel-alloy cast iron, then honed to specified tolerances. Application—for outstanding service with normal fluids and resistance to many corrosive fluids in which steel barrels are not satisfactory.

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UNITED STATES STEEL

piping repairs *cost more* today!

Crane No. 7
150-Pound Brass Globe Valve
with composition disc

You spend less
by using Dependable Quality

CRANE VALVES

. . . That's why more Crane Valves are used than any other make

Disc repairs made in a minute

You save maintenance time and money when you use Crane No. 7 Brass Valves with composition disc. When a leak shows up, you don't change valves . . . just open the bonnet joint and slip on a spare disc holder with a new disc already in it.

And by changing the type of disc, you can adapt No. 7 valves to a wide range of services—steam, hot water, cold water, air, oil, gas, and gasoline. Made in globes and angles; screwed or flanged ends.

Simplified maintenance and complete adaptability to your service typify Crane Quality valves and fittings for every need. That's why they cost less in the long run.

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VALVES • FITTINGS • PIPE • PLUMBING • HEATING

EVEN IF YOU CAN'T SEE IT ...YOU CAN STILL *FIND* IT!

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Gamma Ray Curve, Neutron Curve and Collar Logs let you "see" the porosity of sands and their depth, the position of fluid bearing zones, the fluid levels and all this can be "seen" through several strings of casing where necessary.

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EVERY JONES PONY ROD is made to the same high standards as Jones Sucker Rods. Pony rods undergo the greatest stress . . . lift the heaviest loads. Always use Jones Pony Rods with Jones Sucker Rods.
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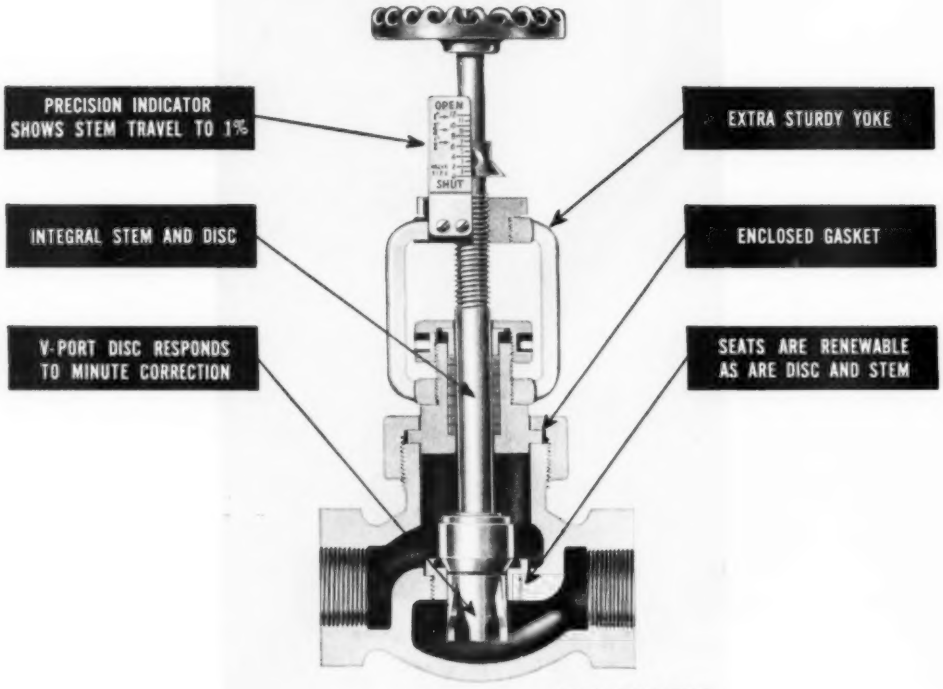
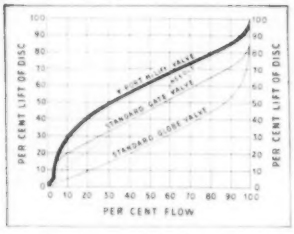
Assures greater precision in manual control of flow . . . the Honeywell HI-LIFT valve


PRECISION INDICATOR SHOWS STEM TRAVEL TO 1%
INTEGRAL STEM AND DISC
V-PORT DISC RESPONDS TO MINUTE CORRECTION
EXTRA STURDY YOKE
ENCLOSED GASKET
SEATS ARE RENEWABLE AS ARE DISC AND STEM
OPEN
SHUT

Write for Bulletin 242-2



Flow characteristics of the Honeywell Hi-Lift Hand Control Valve far surpass those of conventional designs . . . offer favorable comparison to the precision of such diaphragm operated control valves as the Honeywell Series 700.

THE superior flow characteristics of the Honeywell Hi-Lift Hand Control Valve become immediately apparent when compared with conventional globe or gate valves.

In addition to the illustrated features, your comparison will show how the positive-seated, V-ported (or contoured) disc assures proportional flow throughout the entire lift of the stem . . . how the micrometer indicator is set to control flow *within one-hundredth of a turn of the stem* . . . how the unique construction prevents spinning of valve disc during operation, permits repacking with valve open and under pressure.

Write for Bulletin 242-2.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 1906 Windrim Ave., Philadelphia 44, Pa.

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Honeywell
Valve Products

A great combination

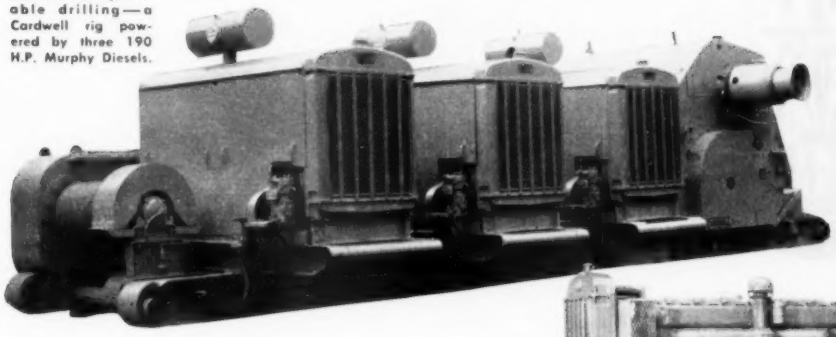
for more profitable drilling

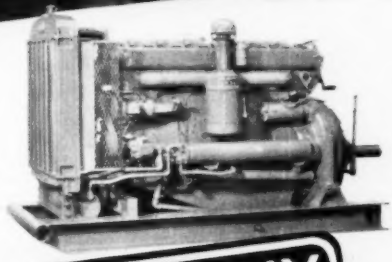
. . . a good rig

and

MURPHY DIESEL POWER

A typical good combination for profitable drilling—a Cardwell rig powered by three 190 H.P. Murphy Diesels.





A good rig or good power alone isn't enough for good drilling but when you hook Murphy Diesels onto a good rig, you have the right combination for really making hole. That's because Murphy Diesel Power is heavy duty power that is immediately responsive. It's economical power, too, enabling you to make more hole per gallon of fuel.

Full details are given in the booklet, *"10 Questions to Ask a Diesel Engine Salesman"*. Ask your Murphy Diesel Dealer for a copy or write direct.

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Heavy duty power

for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.

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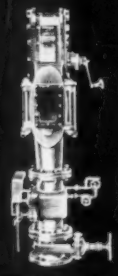
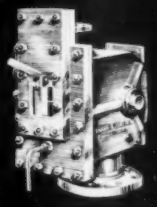
Fittings for Spheres too!



Semi-Automatic Tank Gauge and Sampling Lock, Fig. ST-3320 "DLB." Can be used for sampling and temperature thiefing. It is mounted here on S&J's Quick Opening Gate Valve, Fig. TT-135 which can be opened or closed with only half the number of turns required by other valves.

Pilot Operated Safety Relief Valve, Fig. ST-2500. Designed to protect tanks from excessive internal pressure. One pilot valve can serve one, two, or more main valves to meet high venting requirements. Main valve pallet is seated under pressure to moment of venting. This valve requires no great excess pressure for full venting capacity.

Vacuum Breather Valve, Fig. ST-1926. Designed to meet the unusual vacuum breathing requirements of pressure storage tanks, and to withstand high internal pressures when not in operation under a vacuum. This valve is automatically self draining, and utilizes a hinge type pallet.



High Pressure Automatic Tank Gauge, Fig. ST-400, will consistently and accurately measure product depths. Features new Safety Closure to protect extra thick Safety Glass. Gauge greatly reduces time required to measure tank contents accurately, because it can be installed at eye level height.

Shand and Jurs Co. 8TH AND CARLTON STREETS : BERKELEY : CALIFORNIA

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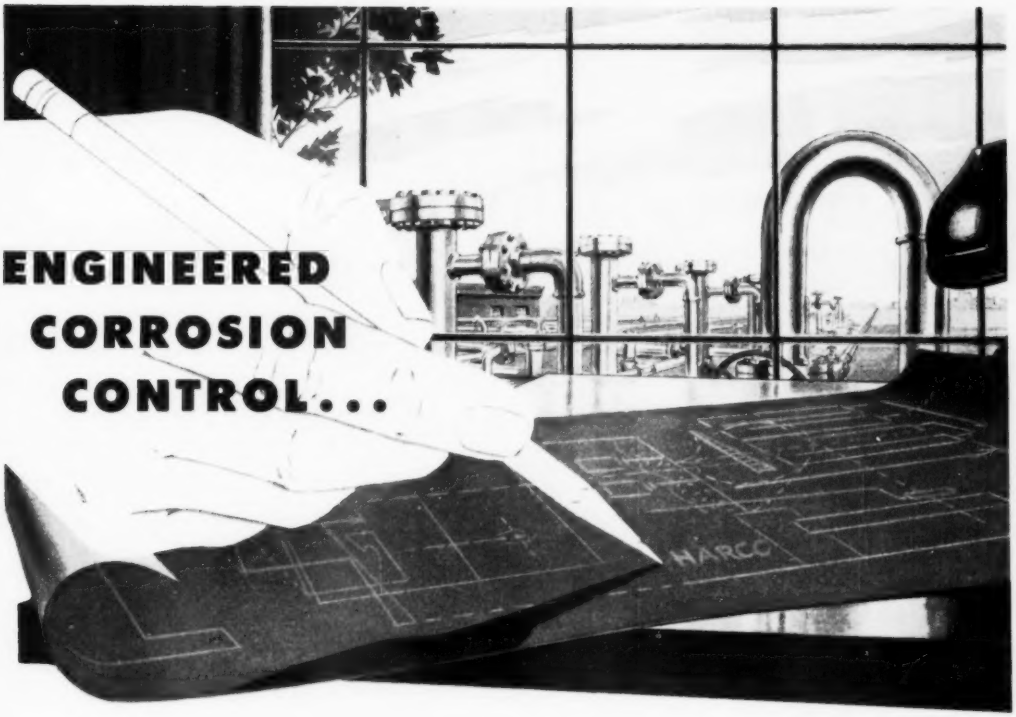


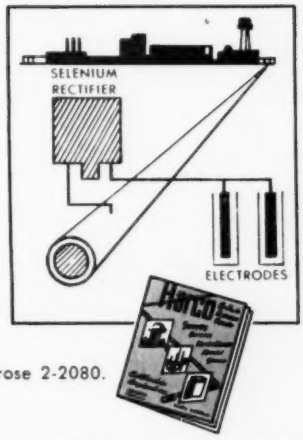
with *Harco* cathodic protection systems!

Complete protection against corrosion is the guarantee provided by HARCO engineered and installed cathodic protection systems. Only a properly engineered and installed corrosion elimination system can assure you of extended working life for water storage tanks and underground pipe lines and cables.

In each application, numerous factors must be considered for maximum cathodic protection. For instance, HARCO engineers check soil conductivity and moisture content, soil water chemical characteristics, dissolved oxygen content, temperature, seasonal variations of environment, protective coatings, dissimilar metals, position of other metallic structures and presence of stray currents.

Results of the HARCO engineered corrosion elimination system include lower maintenance and replacements costs, reduction of "down-time", elimination of excess material for "corrosion factor" lower depreciation rates and greater protection against personal and property damage from hazards caused from corrosion.

Write HARCO engineers today for catalog
containing information on cathodic protection systems or call MOntrose 2-2080.



285 HC

THE *Harco* CORPORATION *Cathodic Protection Division*

OFFICES IN PRINCIPAL CITIES

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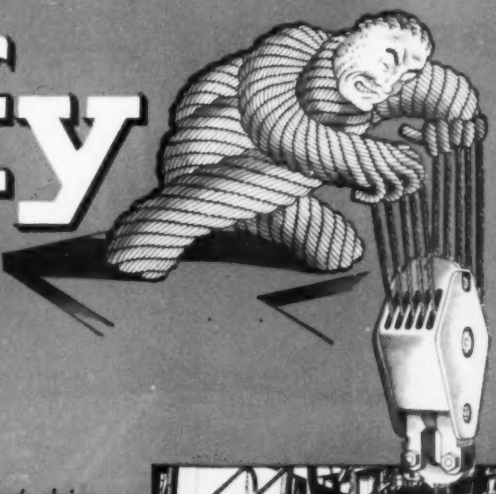
On Either Standard or Jackknife Rigs

YOU GET MORE ROUND TRIPS

with

Tuffy®

ROTARY LINE

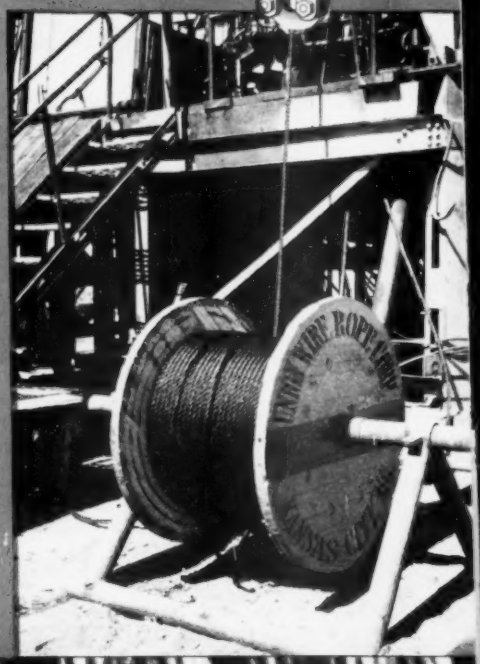


This is not merely a manufacturer's claim. It is backed up by field tests of Tuffy Rotary Line on both standard and jackknife rigs. To make these tests, Union Engineers worked closely with drillers in the field.

The Tuffy Rotary Line is made of special steels and employs a unique construction. It has higher resistance to abrasion, shock loads, drum crushing and internal friction. These are the things that cause early rope fatigue.

On jackknife rigs, Tuffy ***Jackknife*** Rotary Line spools and reeves better and operates at higher speeds over the smaller sheaves and drums of the jackknife rig.

Tuffy ***Standard*** Rotary Line is designed for use with a standard rotary rig. It will give you maximum performance and more round trips. It is also easy to cut, when necessary, and spools well. For deeper drilling with jackknife rigs, Tuffy ***Standard*** Rotary Line is recommended.



Easy To Order

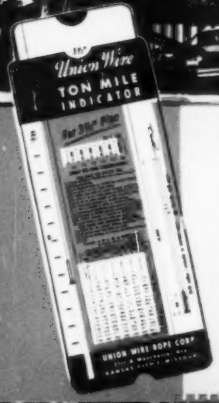
When you order Tuffy Rotary Line, you do not have to remember complicated specifications. Just give size, length and whether Tuffy **Jackknife** or Tuffy **Standard**.

Lower Wire Rope Costs By Measuring The Work Your Drilling Line Does

Now Union gives drillers a way to measure the drilling line service for the purpose of establishing the correct time for line cutting. When you know this, you can prevent cutting the line too soon or over-loading, either of which lowers ton mileage. And it will aid you in avoiding more line breaks and costly fishing operations. By measuring ton-mileage, you can make a much better showing in drilling performance.

Mail This Coupon To Have Your Ton-Mile Indicator Delivered To You

A Union field representative will bring you your free ton-mile indicator and show you how easy it is to use. He will also give you a handy Union Log Book. The indicator does all the complicated figuring for you. Merely set the figures from your log book on the indicator and read the answer. Mail the coupon today.



UNION WIRE ROPE CORPORATION

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Gentlemen: Please have a Union field representative deliver my Union Ton-Mile Indicator and Log Book and explain its use.

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WAGES: The Howco cementer is a carefully selected technician equipped by training and experience to handle any problem that a wide variety of conditions may present.

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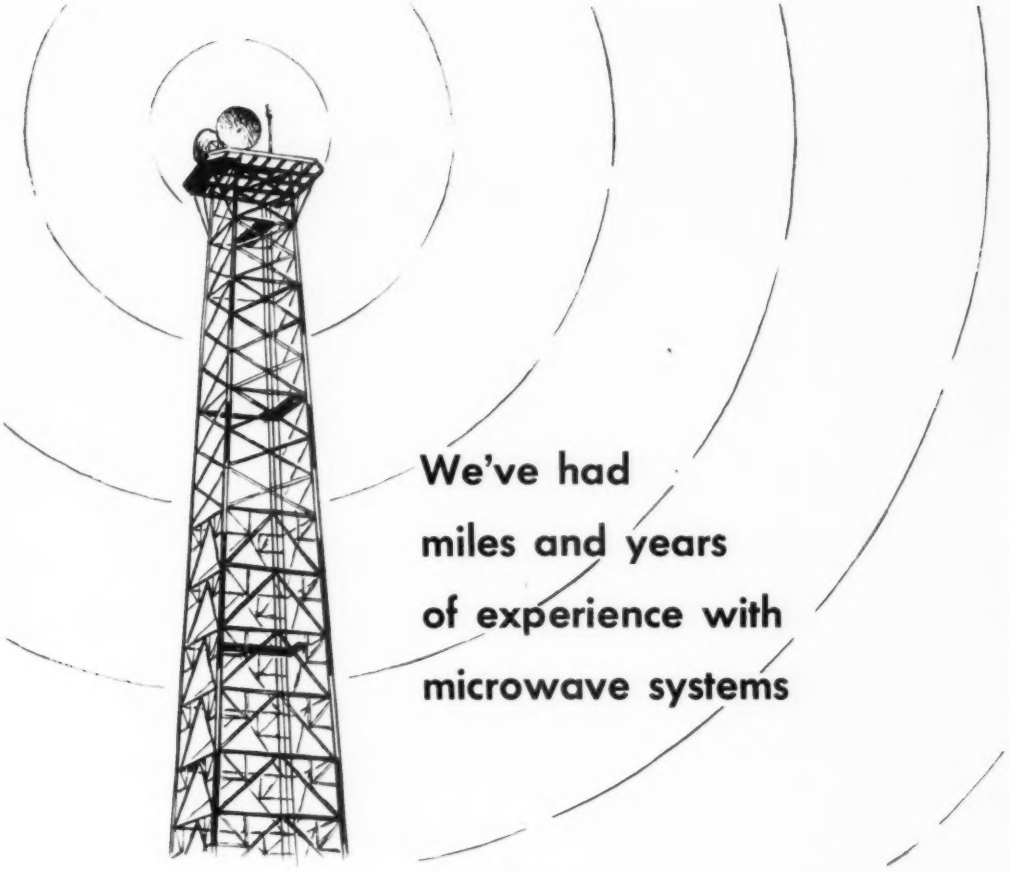
By any yardstick, Halliburton cementing prices are low.

Erle P. Halliburton

Chairman of the Company

HALLIBURTON OIL WELL CEMENTING CO.
Duncan, Oklahoma



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Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

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MOBILE TELEPHONE

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Say good-bye to Tube troubles!

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(a patented alloy)*

Long-lasting because there's enough antimony to resist dezincification.

Long-lasting because the antimony does not affect the grain structure of the metal—won't weaken the tube.

Long-lasting because years of tests and actual use have proved that the right amount of antimony increases the life of the tube.

So before you replace heat exchanger tubes . . . ask about Chase Antimonial Admiralty.

CHASE WAREHOUSE STOCKS:
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FREE CHASE BOOK discusses corrosion problems and selection of proper alloy for condenser and heat exchanger tubes.

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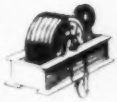
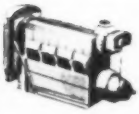
CHASE 75th ANNIVERSARY 1876 1951

"NATIONAL BLUE"

. . . around the clock

. . . around the world





Wherever you go in the oil country you'll see the well-known "National Blue" drilling and pumping machinery—a familiar reminder that National Supply equipment is hard at work around the world, around the clock.

At the oil frontiers, everywhere, National Supply arrived with the pioneers and remained to furnish the drilling and producing equipment in the development of all the major oil fields.

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In the United States and Canada, National Supply Stores carry complete stocks of drilling and production equipment, as well as replacement parts and operating supplies. At each store there are experienced oil country men ready to help you select and get 'round-the-clock service from your "National Blue" equipment—why not drop in and get acquainted?

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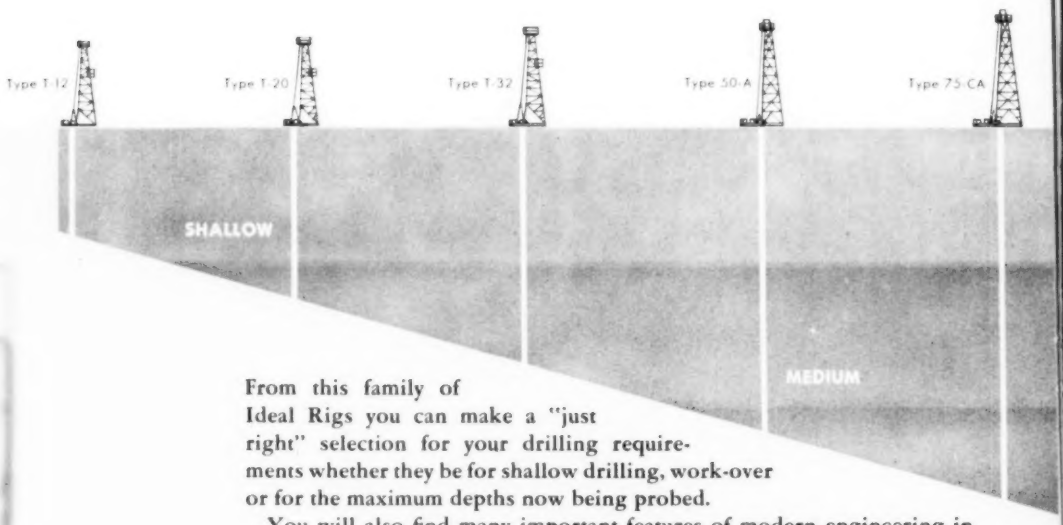
NATIONAL BLUE PRODUCTS

your drilling rig requirements . . .

1,000 FEET? OR 20,000 FEET? . . .



From this family of Ideal Rigs you can make a "just right" selection for your drilling requirements whether they be for shallow drilling, work-over or for the maximum depths now being probed.

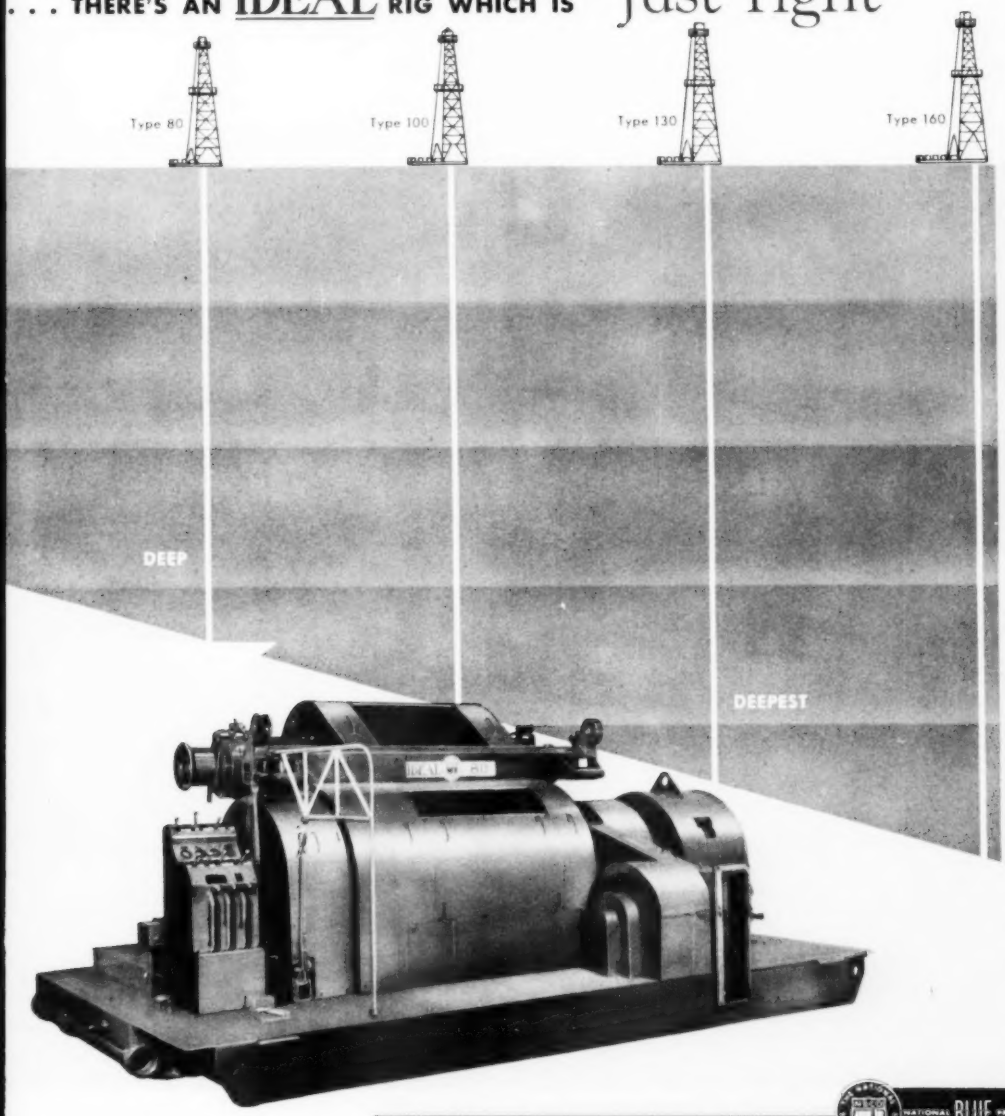
You will also find many important features of modern engineering in these rigs—engineering that is the result of our close personal contact with the petroleum industry throughout the world—engineering that not only fulfills its current requirements but also anticipates those of the future. You'll want to look particularly at these—

- **large-diameter drums which decrease wear on wire lines**
- **conveniently arranged smooth-action, air controls for easy operation**
- **compact arrangement of equipment within minimum dimensions to simplify transportation**
- **transmissions and drives designed for maximum effective use of engine horsepower**

The oil field equipment specialists at your National Supply Store will supply additional information and bulletins on IDEAL Rigs for any type of drilling. Be sure to call on them for details.

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT · SPANG STEEL PIPE ·

. . . THERE'S AN IDEAL RIG WHICH IS "just right"



NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY

General Sales Offices: Toledo, Ohio

SUPERIOR & ATLAS ENGINES

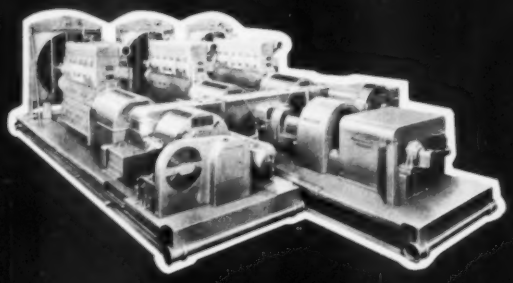
DIVISION OFFICES: CASPER; FORT WORTH; HOUSTON; PITTSBURGH; TULSA; TORRANCE.

CANADA: THE NATIONAL SUPPLY COMPANY, LIMITED, ROOM 202, ALBERTA BLOCK, CALGARY, ALBERTA.

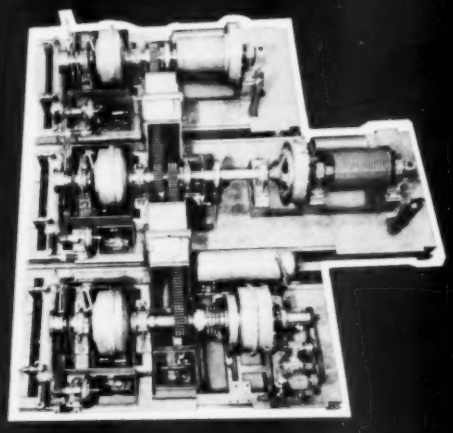
EXPORT: NATIONAL SUPPLY EXPORT CORPORATION, 600 FIFTH AVENUE, NEW YORK 20, N.Y., U.S.A.; RIVER PLATE HOUSE, 12 S. PLACE, LONDON E.C. 2

IDEAL

SECTIONAL DRIVE GROUPS



3-Section Type "B" Drive Group with 24" Airflex Engine Clutches and 1½" Triple Compound Chain



3-Section Type "B" Drive Group with No. 315 Ideal-Gyrol Fluid Drive and 1½" Triple Compound Chain. Illustration shows all Drive Guard Covers removed. Engine End of Sections not in view.

Ideal Drive Groups, in 2, 3, or 4 engine combinations, can be assembled with features to suit your entire rig power requirements. You have a choice of:

- **Fawick Airflex Mechanical Drive**
- **Ideal-Gyrol Fluid Drive**
- **Torque Converter Drive**

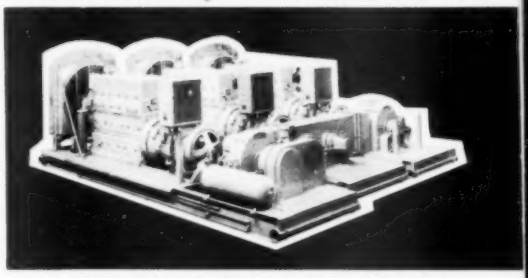
Any of these drives are adaptable to—

- **Superior-Atlas Diesel, Gas or Dual-Fuel Engines**
- **in a horsepower range from 450 to more than 2000**
- **with one or two pump drives**

Any individual section of an Ideal Drive Group is an integrated piece of machinery comprising an engine with a drive shaft so accurately aligned in our plant as to assure lifetime service with but normal inspection.

Watch a drilling crew rig-up or disassemble an Ideal Drive Group and you will appreciate how sectionalized construction economizes on time and labor costs.

You can obtain bulletins and more detailed specifications on Ideal Sectionalized Drive Groups at your National Supply Store.

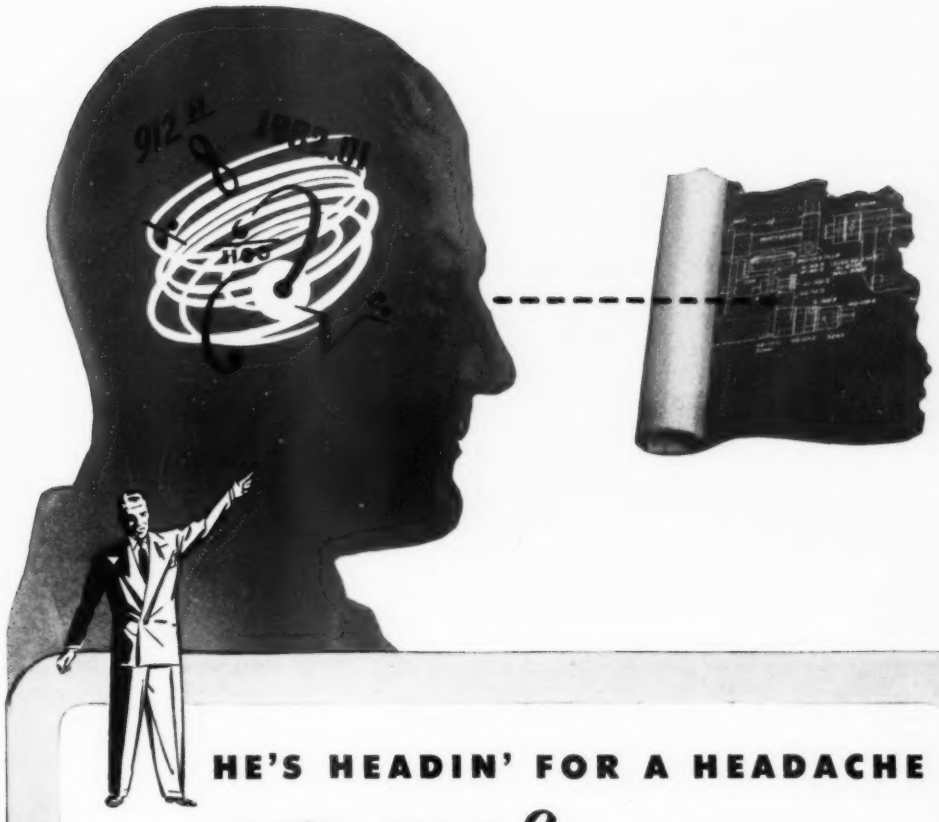


3-Section Type C-LS Drive Group with Twin Disc Torque Converters and Quadruple Pump Drive Sprocket

NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY

General Sales Offices: Toledo, Ohio



HE'S HEADIN' FOR A HEADACHE

.....*are you?*

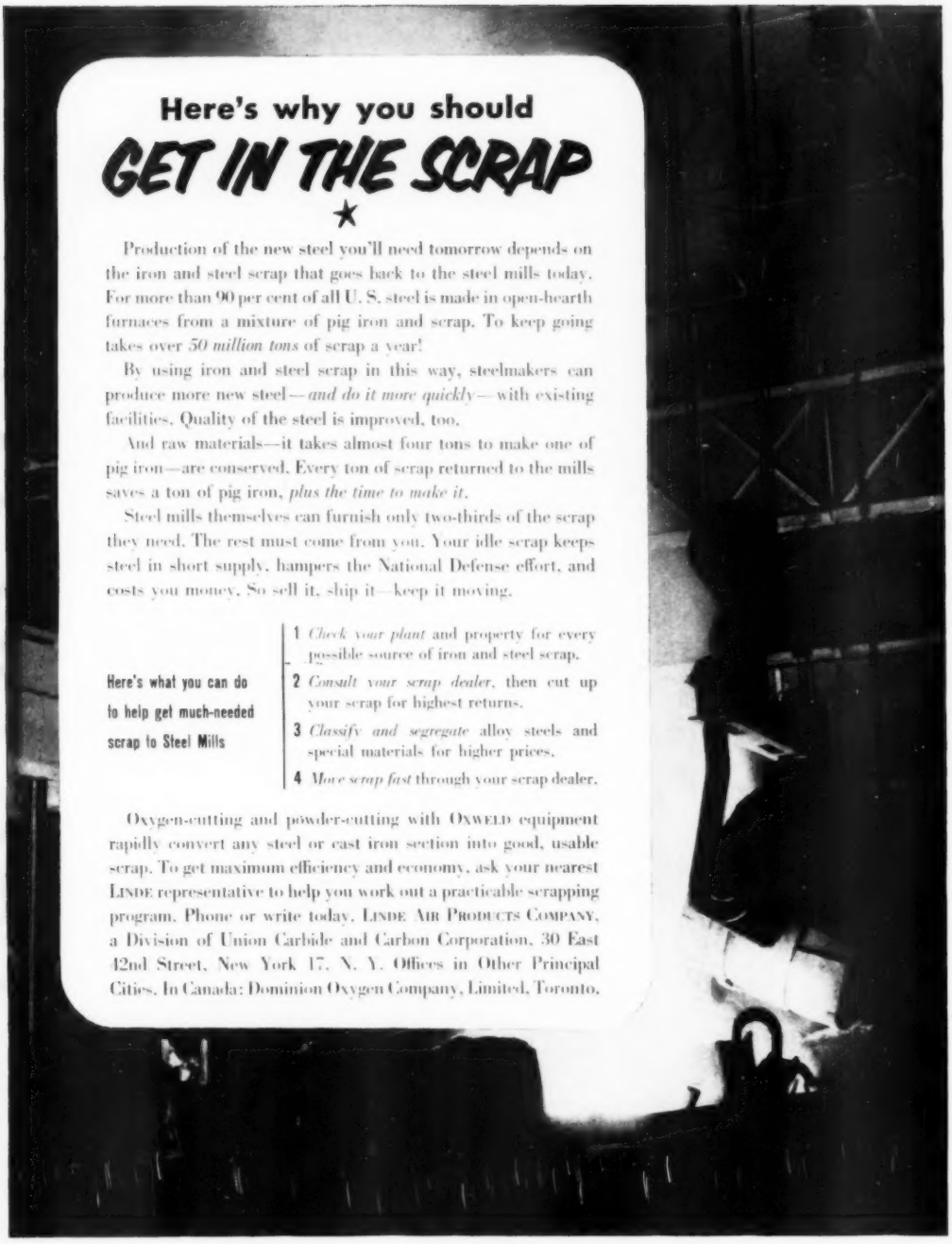
Nearly every design engineer has had the same experience—developed a seemingly "perfect" new machine right up to the final blue print stage only to find hidden "bugs" that spell trouble ahead.

Often these "bugs" stem from bearings—their improper or inadequate application. *THAT IS!*

Most engineers, when confronted with anti-friction problems, turn to specialists—engineers who have accumulated years of experience and "know-how" in this one field. Such is the caliber of Aetna's engineering staff. Thanks to them, leading machinery manufacturers often save months of needless time, effort and expense in product development.

If you're heading for a headache which sound anti-frictioneering can forestall, consult Aetna. Whether you require new bearings or precision parts "designed from the ground up", or merely help in selecting standard bearings, Aetna stands ready to solve your problems in the shortest possible time and at the lowest possible cost. Aetna Ball and Roller Bearing Company, 4600 Schubert Avenue, Chicago 39, Illinois.

Standard and Special Ball Thrust Bearings • Angular Contact Ball Bearings • Special Roller Bearings • Ball Retainers • Hardened and Ground Washers • Sleeves • Bushings • Miscellaneous Precision Parts



Here's why you should

GET IN THE SCRAP

★

Production of the new steel you'll need tomorrow depends on the iron and steel scrap that goes back to the steel mills today. For more than 90 per cent of all U. S. steel is made in open-hearth furnaces from a mixture of pig iron and scrap. To keep going takes over *50 million tons* of scrap a year!

By using iron and steel scrap in this way, steelmakers can produce more new steel—*and do it more quickly*—with existing facilities. Quality of the steel is improved, too.

And raw materials—it takes almost four tons to make one of pig iron—are conserved. Every ton of scrap returned to the mills saves a ton of pig iron, *plus the time to make it*.

Steel mills themselves can furnish only two-thirds of the scrap they need. The rest must come from you. Your idle scrap keeps steel in short supply, hampers the National Defense effort, and costs you money. So sell it, ship it—keep it moving.

Here's what you can do to help get much-needed scrap to Steel Mills

1 *Check your plant* and property for every possible source of iron and steel scrap.

2 *Consult your scrap dealer*, then cut up your scrap for highest returns.

3 *Classify and segregate* alloy steels and special materials for higher prices.

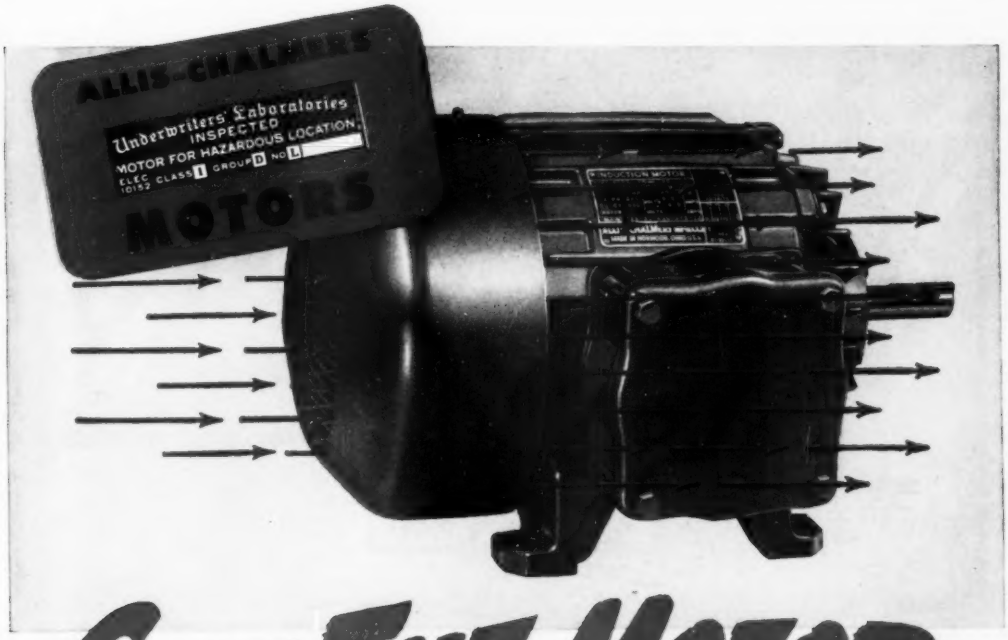
4 *Move scrap fast* through your scrap dealer.

Oxygen-cutting and powder-cutting with OXWELD equipment rapidly convert any steel or cast iron section into good, usable scrap. To get maximum efficiency and economy, ask your nearest LINDE representative to help you work out a practicable scrapping program. Phone or write today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

Linde
Trade-Mark

Products and Processes for MAKING, CUTTING, JOINING, TREATING, AND FORMING METALS

The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.



GET THE MOTOR that Cleans Itself

DROP MOTOR MAINTENANCE COSTS to a new low by reducing motor cleaning operations. And this new Allis-Chalmers Type APZZ explosion-proof motor makes maintenance costs lower than ever before on this type of motor.

Here's Why

Concealed air passages have been eliminated; dirt cannot build up to cause overheating. Cooling air is blown over the ribbed cast iron frame and bearing housings carrying dirt away with it. How about oily dirt that sticks? It can be wiped or blown off without stopping the motor.

Rigid Construction

The frame is rigid cast iron which not only has high inherent corrosion resistance, but also holds bearings in alignment. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZZ explosion-proof motor is built in all NEMA standard frame sizes from 224* to 505. Your A-C Authorized Dealer or District Office has complete information. Call today or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B6145. A-3399

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS

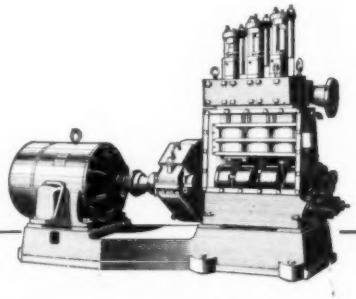
*Similar design non-ventilated motors Type APKK, also available in frames 203 to 224 inclusive.

more horse-power per pound

Famous for stamina and a sure foot, the burro was a hard-working "pardner" of the old-time prospector. He's a little fellow—but he packs more horse-power per pound than any of his four-footed cousins . . .

This ability to get more work done with fewer pounds to do it is precisely what Aldrich Direct Flow Pumps have to offer. As a result of improved design, weight of the fluid-end is considerably reduced. And—whereas a speed of 150 rpm was formerly considered high for reciprocating pumps—these compact, Direct Flow units are operating today at speeds of 500 rpm for the 3"; 360 rpm for the 5"; and 300 rpm for the 6" stroke. In each case, you get greater volume and higher pressure from a smaller pump: *you get more horse-power per pound.*

Applications where you'll find Aldrich Direct Flow Pumps putting in time and over-time include: water flooding, salt water disposal, pumping lean oil to absorbers, and the handling of diethylene glycol, gasoline, propane, butane. Request Data Sheets 64, 64-B for complete information.



THE ALDRICH PUMP COMPANY

9 GORDON STREET · ALLENTOWN, PENNSYLVANIA

...Originators of the Direct Flow Pump

Representatives: P. H. Arden, P. O. Box 185, Glenview, Ill. • Bushnell Controls & Equipment Co., 3929 W. Jefferson Blvd., Los Angeles 16, Calif. • L. T. Gibbs, 509 Petroleum Bldg., Tulsa 3, Okla. • R. B. Moore Supply Co., Inc., Bolivar, N. Y. • Power Specialty Co., 2000 Kipling St., Houston 6, Texas • Reeves & Skinner Machinery Co., 2211 Olive St., St. Louis 3, Mo. Stearns-Roger Manufacturing Co., 1720 California St., Denver 2, Colo. • Export Sales: Petroleum Machinery Corp., 30 Rockefeller Plaza, New York 20, N. Y. • Birmingham • Boston Buffalo • Cincinnati • Cleveland • Detroit • Duluth • Jacksonville • Omaha • Philadelphia • Pittsburgh • Portland, Ore. • Richmond, Va. • San Francisco • Seattle • Spokane, Wash. • Syracuse

Steel Scrap is Very Scarce!

You have given your sons to the Armed Forces

You have devoted your plants to the defense effort

You have joined Civilian Defense

You have bought Defense Bonds...given your blood

Now...will you turn in your scrap?

Without vital scrap, the steel so desperately needed cannot be made.

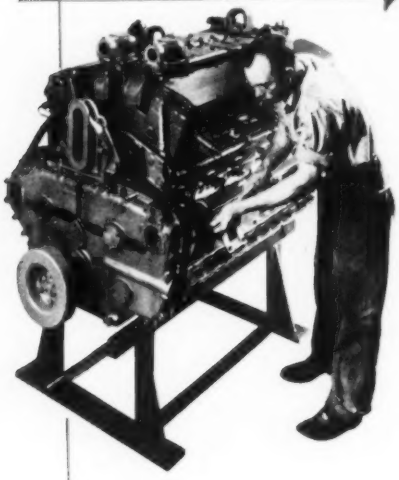
Round up your scrap—call in your scrap dealer *TODAY!*

The Colorado Fuel and Iron Corporation

CF&I

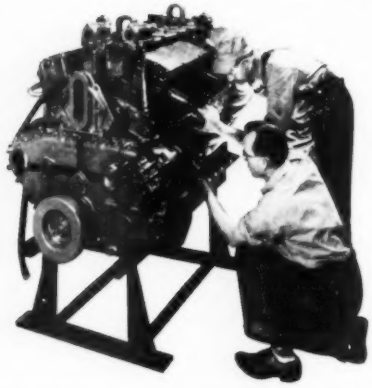
AMERICAN WIRE FABRICS CORPORATION, Mt. Wolf, Pa.
CLAYMONT STEEL CORPORATION, Claymont, Del.
THE CALIFORNIA WIRE CLOTH CORPORATION, Oakland, Calif.
WICKWIRE SPENCER STEEL DIVISION, New York, N.Y.

BUILT NOT ONCE BUT TWICE!



Cummins is the custom-builder of the Diesel industry. Each engine is built to *fit the job*—and the individual piece of equipment in which it is to be installed. And *every* Cummins engine is built *twice*. First, each engine is assembled, run-in tested. Then it is disassembled completely, and inspected. Finally it is reassembled and tested *again*. This extra care in precision building, Cummins exclusive fuel system, efficient parts and service organization . . . mean *less* "down-time" and *more* power and profits for Cummins users. *See your Cummins dealer.*

Cummins®
CUSTOM BUILT Diesels



Lightweight High-speed Diesel Engines (50-550 hp)
for: on-highway trucks
off-highway trucks • buses
tractors • earthmovers
shovels • cranes
industrial locomotives
air compressors
logging yarders and loaders
drilling rigs
centrifugal pumps
generator sets and power units
work boats and pleasure craft

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA
Export: CUMMINS DIESEL EXPORT CORPORATION • Columbus, Indiana, U.S.A. • Cable: CUMDIEX

Diesel power by CUMMINS

CUMMINS Diesel

TRADEMARK REG. U. S. PAT. OFF.

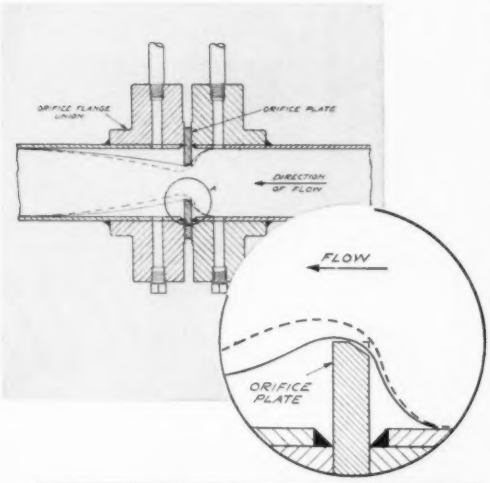
BACK UP FLOW METER ACCURACY

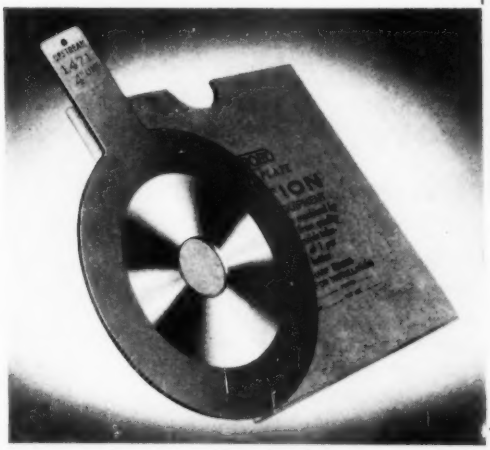
with Accurately-made Orifice Plates

THE PRECISION TOLERANCES of Foxboro Orifice Plates may seem extreme, but results over the years have paid off in worthwhile savings to users. These thin-plate, square-edge orifices are bored to an accuracy of 1 20th of 1% of the orifice diameter . . . which means a measuring accuracy within 1 10 of 1% (0.001).

The importance of the *square* leading edge can be seen from the diagram at the right. If the upstream edge of the orifice is dulled to a radius of as little as .005", it's equivalent to an orifice bored .01" too large . . . resulting in an error in flow measurement of as much as 2% or more, depending on orifice size.

Naturally, orifice plates made to close limits of accuracy require careful storage and handling. They are and should be regarded as a very important part of the flow meter installation.





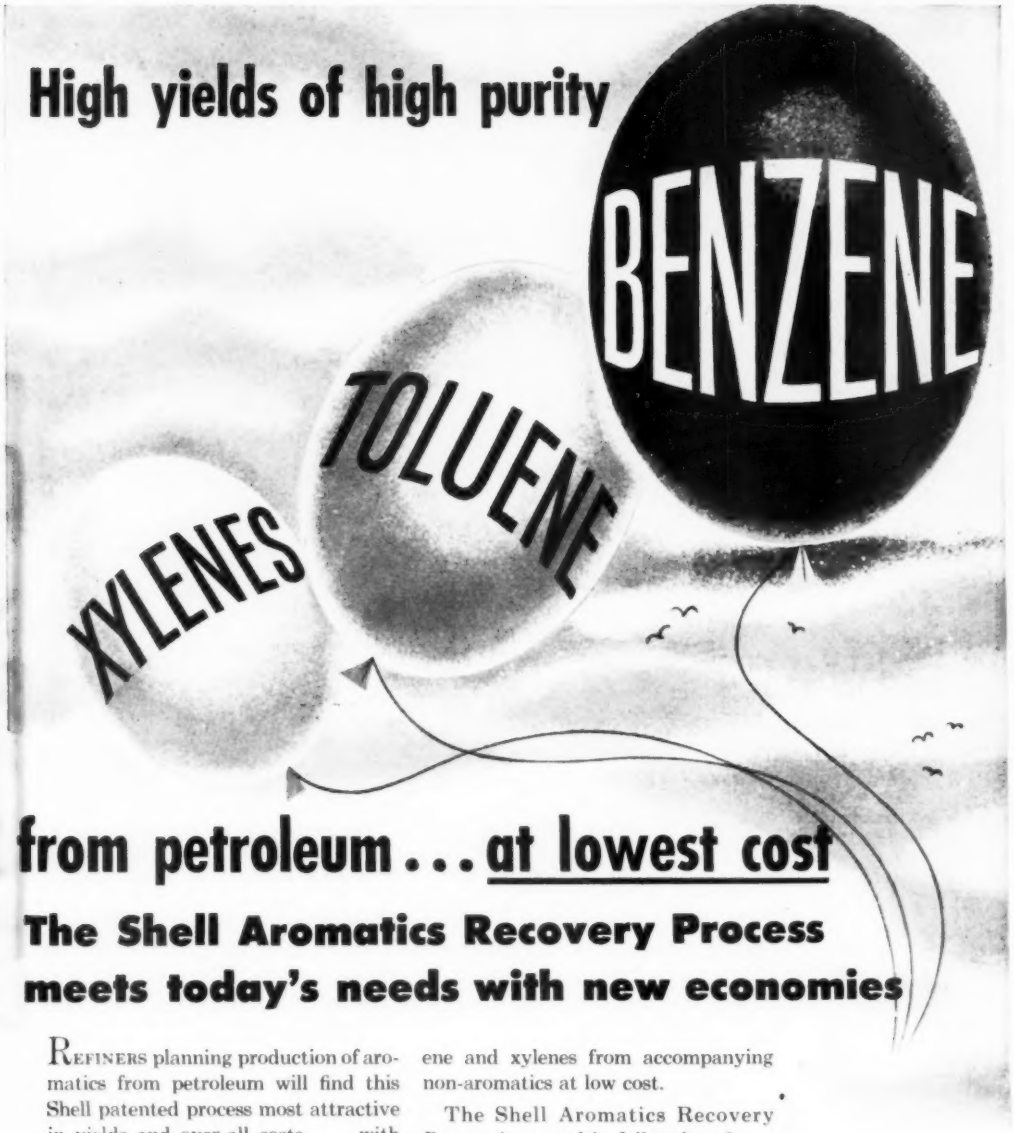
Check these Advantages of FOXBORO Orifice Plates

- ★ **Precision bored, with square upstream edge, for maximum accuracy**
- ★ **Supplied in metal best suited to specific service conditions**
- ★ **Bored plates enclosed in individual envelopes for protection during shipment and storage**
- ★ **Easy to install between union flanges**
- ★ **Data always visible on projecting tabs**
- ★ **Low in cost**

Write, giving available details of your metering problem, for further details on Foxboro Orifice Plates. (Foxboro also furnishes flow nozzles, Venturi tubes, and Pitot tubes, whenever requirements call for these alternative primary elements.) We'll gladly send bulletin which describes Foxboro Flow Meters as well. Address: **The Foxboro Company, 608 Neponset Ave., Foxboro, Mass., U. S. A.**

FOXBORO ORIFICE PLATES

REG. U. S. PAT. OFF.



from petroleum . . . at lowest cost

The Shell Aromatics Recovery Process meets today's needs with new economies

REFINERS planning production of aromatics from petroleum will find this Shell patented process most attractive in yields and over-all costs . . . with lowest commitment of critical construction materials.

The Shell Aromatics Recovery Process assures high-yield, selective separation of high purity benzene, toluene and xylenes from accompanying non-aromatics at low cost.

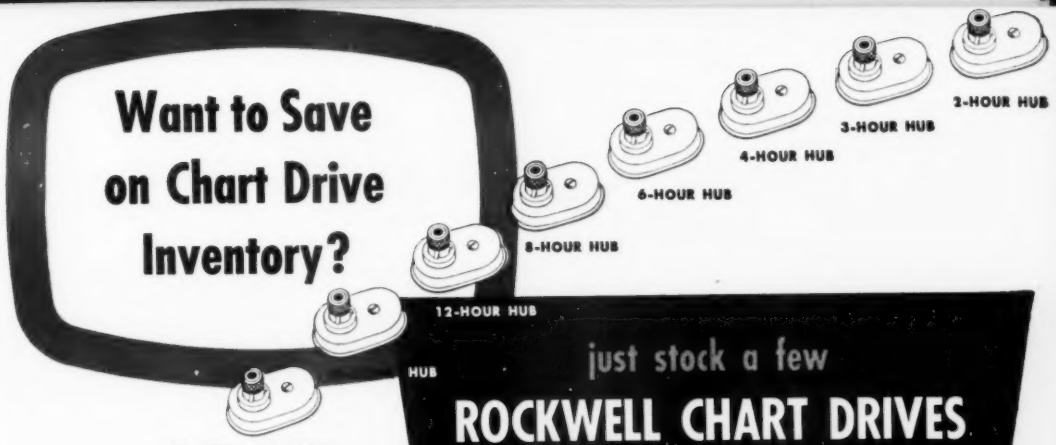
The Shell Aromatics Recovery Process is proved in full-scale refinery operation. It is available to refiners under a license from the Shell Development Company . . . together with experienced engineering service for its design and operation.

SHELL DEVELOPMENT COMPANY

50 WEST 50TH STREET • NEW YORK 20, N. Y.

SHELL

Want to Save on Chart Drive Inventory?



just stock a few

ROCKWELL CHART DRIVES

plus a selection of *inexpensive*

SPEED CHANGING TURRETS

Illustrating how the Turrets lock onto the chart arbor to change rotation speeds. This conversion feature is also available on the 8-day Rockwell midget drive.

For replacement service, the Rockwell standard chart drive is the most versatile, economical you can use. It is thinner than other drives and so can be correctly located in practically any instrument case by means of simple adaptors. One adaptor is furnished with each drive. Rotation speeds are no problem, either. Speed changing Turrets lock onto the chart arbor to provide any one of 11 rotation speeds. Think what this means in reduced inventory, service work, all-around flexibility of application.

Get facts now on long-lived, powerful, Rockwell chart drives. Learn how their use in your instrument shop will save time and money. Write for bulletin.

There are two basic models of the Rockwell standard drive—24 hour rotation, 8 day wind; 7 day rotation, 31 day wind. Turret speed changers provide a wide selection of alternate rotation speeds.

Write for Bulletin 1079

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA.

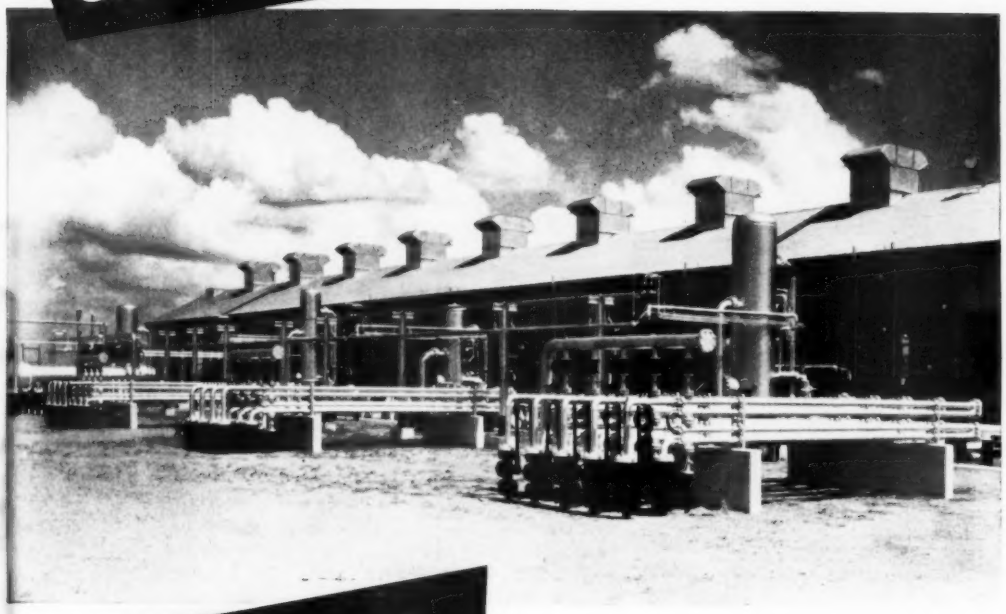
Atlanta · Boston · Chicago · Columbus
Houston · Kansas City · Los Angeles · New York
Pittsburgh · San Francisco · Seattle · Tulsa

You have your choice of two models in the Rockwell Midget. (1) A 24 hour drive with 24 hour rotation only, and a 48 hour rundown. (2) An 8 day drive with basic 24 hour rotation that can be converted with Turrets to 10 alternate speeds ranging from 2 hour to 8 day.

Look into this *MIGHTY MIDGET*

Compact, powerful drives for use in instruments when space is at a premium. They feature a detachable escapement, sealed in clear plastic. They wind through the chart arbor, snap into separate mounting rings which may be positioned on bosses or adaptors to fit any instrument case.

Reduce Obsolescence in your plant



with BROWN FINTUBE sectional hairpin heat exchangers

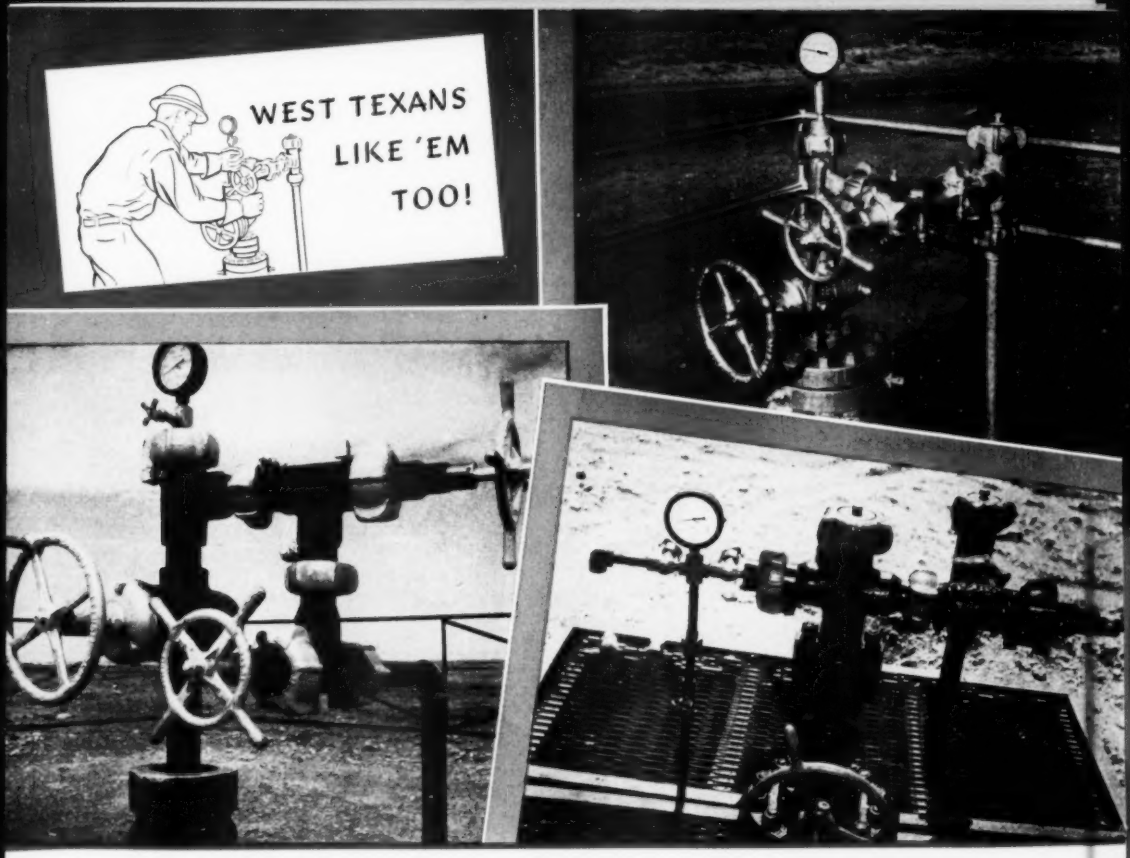
● Brown Fintube's interchangeability of parts, exacting design and precision manufacture has "licked" obsolescence.

The sections can be used in one bank after another — on different duties — and different products. A bank can even be broken up and the sections shipped to two or more plants, miles apart, re-assembled and reused. Sections not in use serve as "stores" for other sections on stream. They are never obsoleted by changes in duty or plant re-arrangements. You can use and reuse them until they are completely worn out. Estimates and quotations furnished promptly. ***Write for Bulletin No. 481.***

THE BROWN FINTUBE CO.
Elyria, Ohio

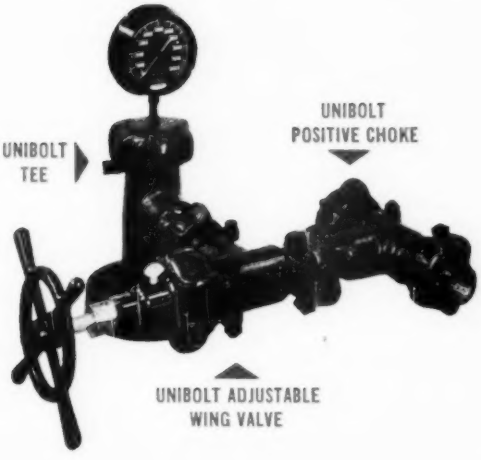
Sectional Hairpin Heat Exchangers
Tank Suction and Line Heaters
Fintube Heaters for Bulk Storage Tanks
Indirect Process Air Heaters
Fintube Heaters for Processing Tanks
Integral Welded Fintubes for Any Heating, Cooling or Heat Transfer Service

NEW YORK • BOSTON • PHILADELPHIA • WILMINGTON • PITTSBURGH • BUFFALO • CLEVELAND • CINCINNATI • DETROIT • CHICAGO
ST. PAUL • ST. LOUIS • MEMPHIS • BIRMINGHAM • NEW ORLEANS • TULSA • HOUSTON • LOS ANGELES • SAN FRANCISCO



Views from Scurry, County, Texas

UNIBOLT *Flow Manifolds*



More and more operators are requesting their Christmas tree supplier to furnish UNIBOLT Flow Manifolds because they are lighter in weight, stronger, and more economical, and easier to maintain than ordinary flanged Christmas tree wings.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

The units of the manifold — UNIBOLT Tee or Cross, Adjustable Wing Valve, and Positive Choke Body — are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs. They are furnishec in regular forged steel or in high-chrome alloy for corrosive wells — 6,000, 10,000 and 15,000 lbs. test. The manifold is completely salvageable.

Any desired volume of well flow may be accurately produced with UNIBOLT Flow-Rated Beans, which are available in flow increments of 5% and 10%, or in standard fractionally drilled sizes. See your Composite Catalog for complete details or write for literature.

THORNHILL-CRAVER COMPANY UNIBOLT **HOUSTON, TEXAS**

MAINTENANCE SERVICE
UNIFIED RESPONSIBILITY
APPLICATION ASSISTANCE
RESEARCH, DEVELOPMENT AND TESTING
CO-ORDINATED ENGINEERING DESIGN
WESTINGHOUSE
DO NOT LUBRICATE
WESTINGHOUSE
Life-Linestarter
PAIRED FOR PRODUCTION
Life-Line motor

EXTRAS like these assure long-range performance

You get more than a motor and a starter when you install these Life-Lines. You get complete design, engineering and service every step of the way.

CO-ORDINATED ENGINEERING DESIGN makes sure that Life-Line motors and Life-Linestarters give long-range performance. They're made together to work together.

RESEARCH, DEVELOPMENT AND TESTING in Westinghouse laboratories result in such features as:

Steel frame
Pre-lubricated bearings...in Life-Line motors
"De-ion"® arc quenchers
Bimetallic relays . . . in Life-Linestarters®

APPLICATION ASSISTANCE to help you select the right motor and control.

Application engineers for your daily problems
Consulting engineers for special design problems
Field offices in 123 locations for all your service requirements

All at your service without obligation.

UNIFIED RESPONSIBILITY . . . for operation of the motors and protective controls.

One supplier . . . makes your work simpler.

MAINTENANCE SERVICE is all-inclusive and nationwide.

36 fully-equipped repair shops
52 engineering and service offices

Who else can offer all these EXTRAS?

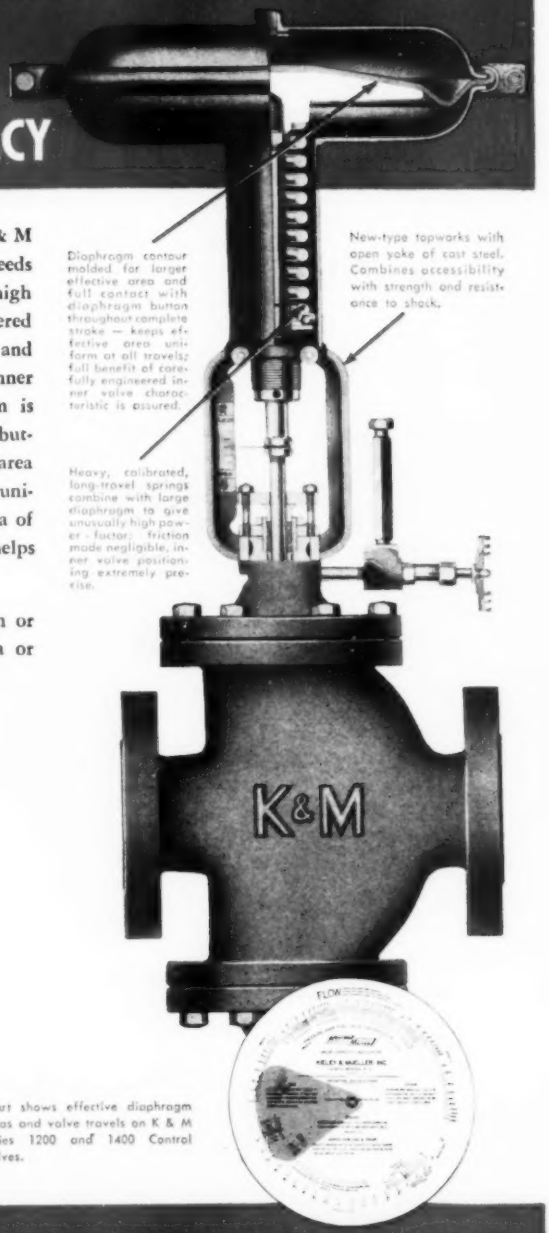
More details? Ask your Westinghouse representative. Call him today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21637

YOU CAN BE SURE.. IF IT'S
Westinghouse
Life-Line
MOTORS and CONTROLS

K&M The Control Valves with GREATER POWER for GREATER ACCURACY

The Diaphragm Motor of the far-advanced K & M Control Valve is designed for the more exacting needs of modern process industries. An unusually high power-factor is obtained by the carefully-engineered relationship of large effective diaphragm area and heavy, calibrated spring; friction is negligible, inner valve positioning more precise. The diaphragm is specially designed for constant affinity with the button contour; this assures a uniform effective area throughout the complete valve stroke, thus more uniformly accurate control. The unusually large area of the diaphragm in relation to the valve size also helps assure more precise control.

K & M motors are available for direct action or reverse action without change in effective area or stroke.


Diaphragm contour molded for larger effective area and full contact with diaphragm button throughout complete stroke — keeps effective area uniform at all travels; full benefit of carefully engineered inner valve characteristic is assured.
New-type topworks with open yoke of cast steel. Combines accessibility with strength and resistance to shock.
Heavy, calibrated, long-travel springs combine with large diaphragm to give unusually high power-factor; friction made negligible, inner valve positioning extremely precise.
K&M

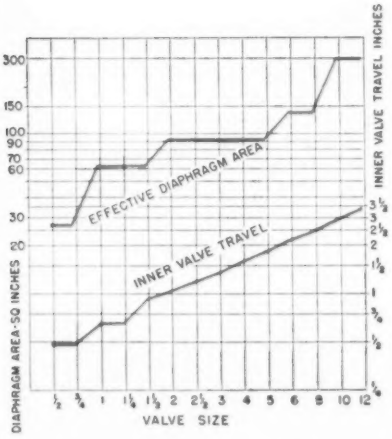


Chart shows effective diaphragm areas and valve travels on K & M Series 1200 and 1400 Control Valves.

KIELEY & MUELLER

Established 1879

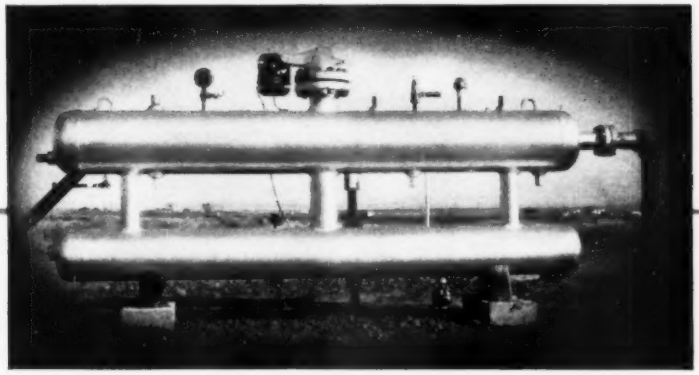
—43rd Street North Bergen, N. J.

This extremely accurate circular slide-rule type K & M valve capacity calculator includes correction scales for steam quality, liquid and gas specific gravity and flowing temperature scale for gases. Sent without charge in response to a request on your business stationery.

More Gas . . . and Liquid . . . Volume

BS&B Horizontal Separator . . .

The Engineered "Bump" on the Flow Line



- Engineered for high capacity and efficiency by combining:
  - Centrifugal force for initial separation.
  - Streamlined horizontal travel for gravitational separation.
  - Efficient mist extractor for final scrubbing.
  - Rugged dependable BS&B controls.
  - Ease of installation.

Horizontal separator capacity is a function of horizontal travel as well as velocity. Save by using BS&B Horizontal Separators!

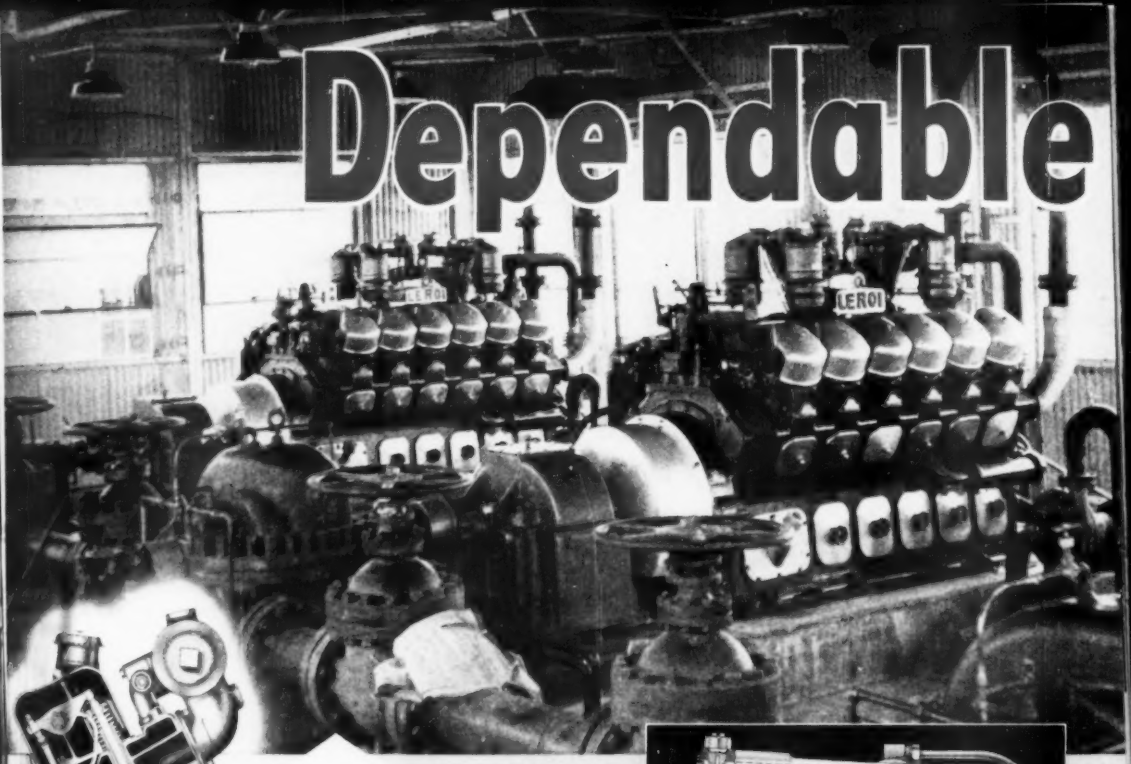
BLACK, SIVALLS & BRYSON, INC.
Oil and Gas Equipment Division
2131 Westwood Blvd., Rm. 3A
Oklahoma City, Oklahoma

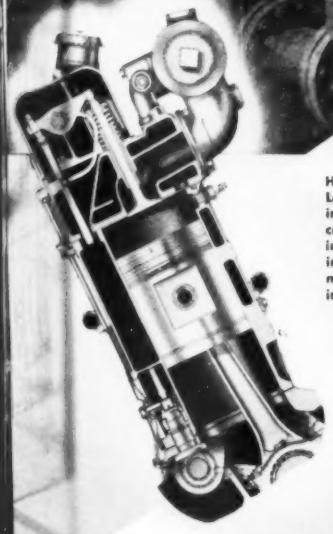
BS&B has grown with the Petroleum Industry, designing and manufacturing efficient, dependable equipment for over 57 years. BS&B leadership continues, now and in the future!

BS&B

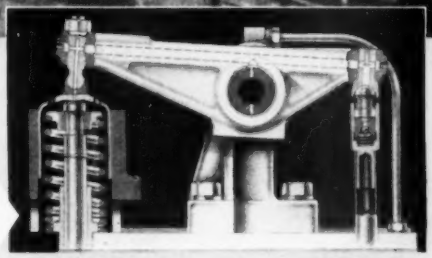
HORIZONTAL OIL-GAS SEPARATORS

Dependable

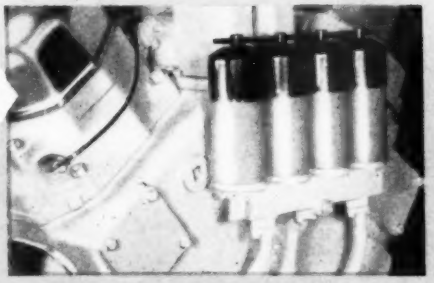




Here's a modern pipeline installation of Le Roi 600 (max) hp L-3460 engines driving multi-stage pumps through speed increasers. Le Roi's 13 years of experience in the pipeline field was a major factor in bringing out the 600 hp L-3460 to meet the industry's need for more power in a low-cost, medium-speed engine.



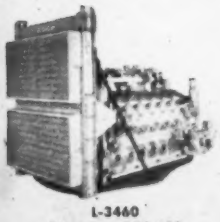
The 600 hp L-3460 is equipped with "zero-lash" hydraulic valve lifters. They eliminate tappet adjustments, increase valve life, make possible smooth, trouble-free operation.



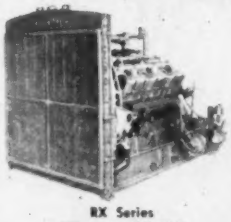
Full-flow, by-pass oil filters and coolers provide sure engine protection — still greater dependability.

Here's a cross section of an RX series engine. Note the guided valve stem mechanism and controlled water circulation around the valves that give long valve and valve-seat life. Light aluminum pistons with full-floating pins are cam-ground and tapered for precise fit, make possible faster acceleration, smoother running.

There's a Le Roi Engine for Every Oil Field Need



L-3460
HP range 280-600



RX Series
HP range 79-410

D Series and H-540
HP range 6-155

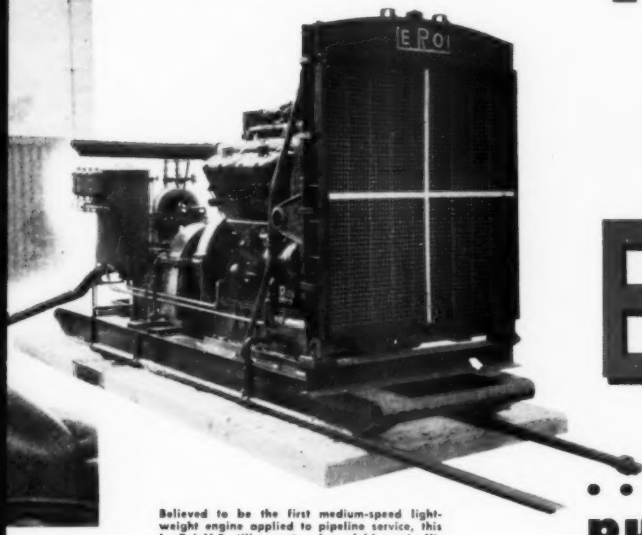
A Typical Le Roi Service Facility

Here's the efficient, well-arranged parts department of Le Roi-Rix Co.'s Long Beach branch. Two more offices — at Bakersfield and Los Angeles — are similarly equipped. All three offices maintain prompt 24-hour service. Le Roi has service facilities like these throughout the oil fields — another reason why you can depend on Le Roi.

low-cost power—

Le Roi Engines

. . . for pipeline pumping service



Believed to be the first medium-speed lightweight engine applied to pipeline service, this Le Roi V-8 still operates dependably and efficiently in a major pipeline station at Placido, Texas.

Medium-speed, lightweight Le Roi engines save money on initial investment, and maintenance

An interesting trend was started in 1938, when the Engineering Department of a major oil company decided to use medium-speed, lightweight Le Roi engines in place of conventional, slow-speed, heavyweight units on a main pipeline installation.

The choice of Le Roi was fully justified. The horsepower per dollar cost was lower. The engines were easier to service — service parts more easily obtained. And performance proved to be dependable and economical. Repeat orders followed until the pipeline project was 100% powered by Le Roi. All ten units are still giving good service.

As news of this successful installation spread Le Roi's popularity for pipeline service grew — and an ever-increasing number of Le Roi installations are being made in other fields. Yes, they're swinging to Le Roi — because Le Roi dependability and low-cost maintenance keep operating expenses to a minimum. Moreover, Le Roi engines are backed by complete service facilities in every active area.

No matter what your engine application is, it pays you to call on your nearby Le Roi distributor. He can show you Le Roi engines at work under conditions similar to yours. See why Le Roi *leads the field — in the field.*

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio — Oilfield Headquarters: Tulsa, Oklahoma

P-108

LEADS THE FIELD

Le Roi Oilfield Sales

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co.— Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company—Centralia, Illinois and St. Louis, Missouri.

IN THE FIELD . . .

Service Network

Michigan
Hafer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

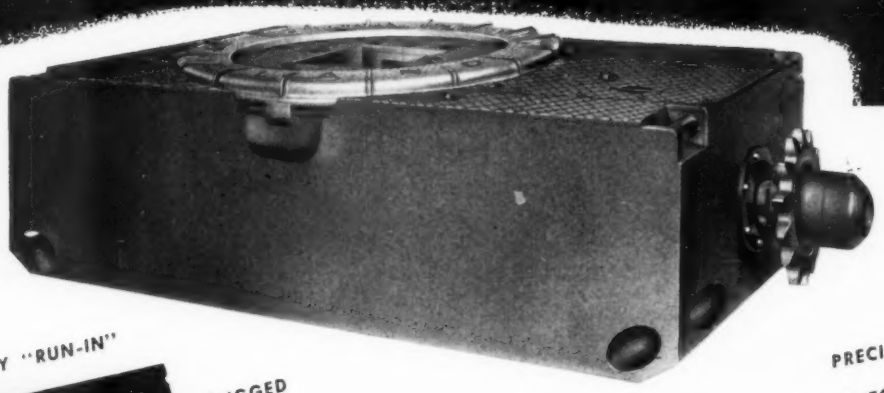
West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

New WHELAND TABLE TOP ROTARY

Model A-17—17½" Through Table • Model A-20—20½" Through Table



FACTORY "RUN-IN"

RUGGED

QUIET

PRECISION BUIL

EASY TO MAINTA

HIGH SPEED, OIL BATH ROTARY WITH RAISED GUARD FOR SAFETY

NEW FEATURE

A recent modification on the New Wheland Table Top Rotary now provides eight sturdy built-in holds, one on each corner, to make this one of the world's easiest rotaries to pick up and move.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

CUTS RIGGING UP TIME

BASE: Fabricated steel plate with cast steel center. Derrick floor easily fitted to box shape. Pipe can be stacked on top surface. Safe! Steel guard raised 1¾" above revolving table.

TABLE: Steel casting rotates on precision ball bearings in hardened and ground races that take both radial and thrust loads.

BRONZE TABLE BUSHING: Alemite lubricated. Prevents scoring of table.

GEAR AND PINION: Gleason spiral gear and pinion, standard equipment. Gears are shock resistant and perfectly lubricated to run smoothly, quietly.

PINION SHAFT ASSEMBLY: Removable as a unit for easy maintenance. Shaft is forged steel, precision machined, mounted on Timken bearings. Pinion locked at factory in perfect alignment with main gear for long trouble-free operation.

INBOARD AND OUTBOARD PINION SHAFT SEALS: In addition to new, improved mechanical seal, a positive type rubbing seal excludes all grit, sand, etc., from outboard bearing.

SUPERIOR LUBRICATION: Proper grade lubricant for each part assured by three separate, securely sealed oil compartments. Fill and check from top. Three separate oil pipes with bell reducers make it easy to add oil, separate automobile type dip sticks for checking oil level.

LOCKING DEVICE: Locking device is simple, positive. Engages ring gear, eliminates shock from pinion, shaft and bearing. Lock handle on top of table, convenient to driller.

SPLIT MASTER BUSHING: Cast steel. Takes A.P.I. Standard drive bushings. Master bushing alone or both master and drive bushings can be locked to table.

FULL MECHANICAL DETAILS ON REQUEST

WHELAND

THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.

ROTARY DRILLING MACHINERY

DRAWWORKS • SLUSH PUMPS
ROTARIES • CROWN BLOCKS
TRAVELING BLOCKS • SWIVELS

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EXPORT DISTRIBUTOR: Lucey Export Corporation, 233 Broadway, New York 7, New York—Broad Street House, London E. C. 2, England

TRADE PAPER EDITION
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SCHUTTE and KOERTING Company

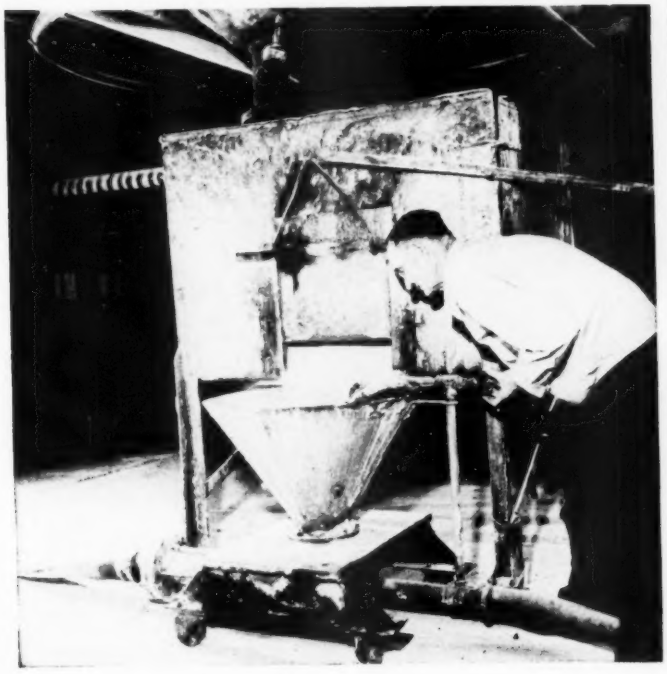
ENGINEERING News

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT •

Novel Portable Unit Conveys Spent Clay From Sun Plant

Sun Engineers Mount SK Hopper Eductor On Rolling Platform to Solve Handling Problem

[Illustration and Story by Courtesy of Sun Oil Company]



WITH the arrangement shown in the photo, engineers at the Marcus Hook, Pa., Refinery of Sun Oil Company neatly solved a materials handling problem and materially decreased the time required to convey spent clay from several filter shells to a settling basin outside the building.

They mounted a standard SK Fig. 254 Hopper Type Eductor on a movable platform in such a way that the hopper is located above the platform and the eductor proper below. Flexible pressure and discharge hose connections are used.

When it becomes necessary to remove spent clay from any one of ten filter shells, a movable secondary drum, or hopper, is rolled under the man-head of the filter shell and the spent clay is dropped into this. A manually operated gate in the secondary hopper is regulated to permit the proper amount of clay to feed into the eductor hopper.

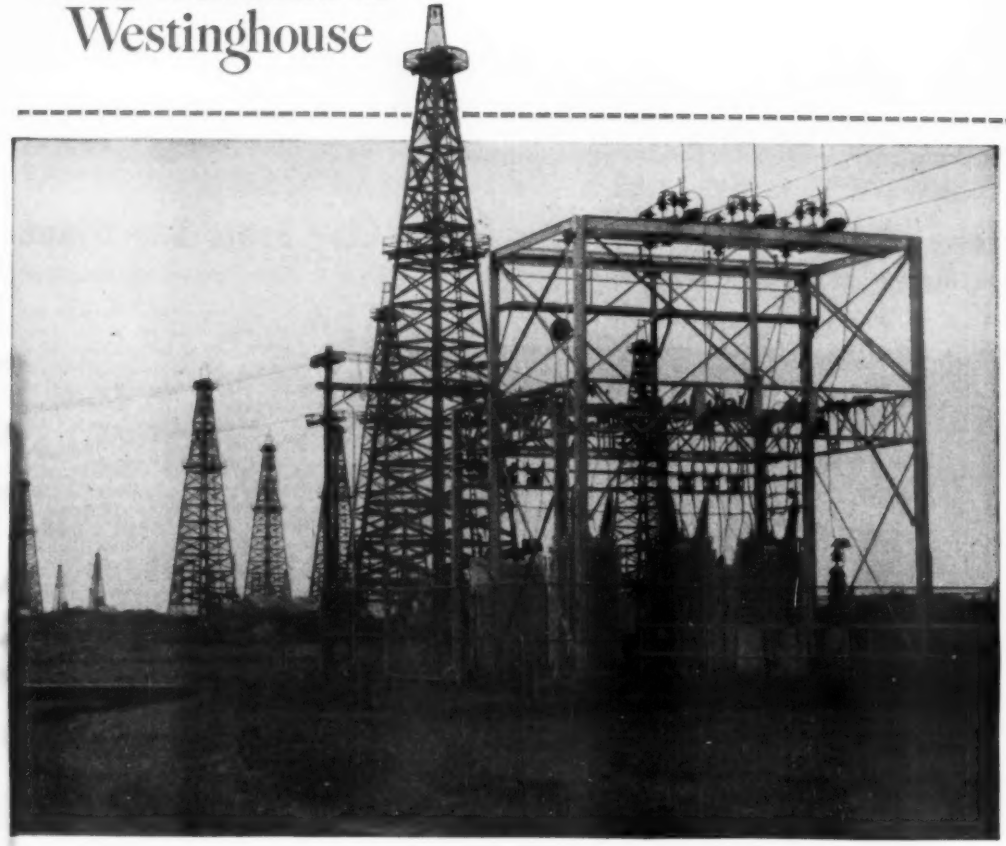
Pressure water, by-passed from the inlet line on the eductor, issues through the secondary spray nozzles in the eductor hopper and washes the clay down into the eductor chamber. Pressure water, issuing through the nozzle of the eductor, entrains the clay and discharges through the flexible hose with sufficient force to carry the clay-water slurry to a settling basin outside the building.

This is but one of many ways a wide variety of standard eductors manufactured by SK have been applied by ingenious engineers in a variety of industries. *For facts and figures on all types of eductors and for ideas and suggestions concerning their use, request Bulletin 2-M.*

This photo shows the extent to which SK Rotameters are used in the plant of Publicker Industries, Inc., of Philadelphia, world's largest producers of industrial alcohol. All of the Rotameters shown on the panel are of the SK Universal type and are used to measure fluid flow rates in the manufacture of commercial alcohol. Numerous sizes are represented since capacity requirements vary considerably. Bulletin 18-RA pictures and briefly describes the numerous types of Rotameters manufactured by SK and lists the technical bulletins available. If interested, send for a copy.

SCHUTTE and KOERTING Company
Manufacturing Engineers
CORNWELLS HEIGHTS
BUCKS COUNTY, PA.
Representatives in Principal Cities

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

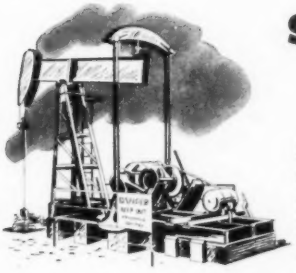


GET THIS HELPFUL HANDBOOK ON ELECTRIFIED PUMPING

Here are 48 pages of helpful facts on electrified pumping . . . authoritative information to help you answer such questions as: What size motors should I specify, which type? How about automatic time control? What's the best distribution system for my lease? And a hundred others. It's a typical indication of Westinghouse "know-how" in every phase of oil-field electrification.

If you haven't already received your copy, write for it now. Ask for B-4039. Address: Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Penna.

How much can *Electrified Pumping* save for YOU?



In one case on record, electrified pumping reduced lifting costs by *36 percent!* In another, it produced savings that completely offset power costs. In every case the savings have been substantial . . . a natural result of these cost-slashing advantages of electrification. *How much will they save for you?*

Lower maintenance costs—Fewer wearing parts mean less inspection . . . less servicing.

Less manpower required—Sure time-clock operation permits maintenance of efficient, intermittent pumping schedule without human attention.

All-weather operation—Sure starting and high efficiency regardless of the weather or age of the equipment: Trouble-free operation at low temperatures; no "freeze-ups" to cause downtime . . . lost production.

Lower installation costs—Only a minimum foundation required; no house needed for weatherproof motor and controls.

Why not analyze your operation in the light of these profit-building possibilities? Westinghouse Petroleum Industry Specialists—representing a single source of supply for every electric pumping need—are prepared to help. Their wide experience in helping others to gain the benefits of electrification assures you of getting the most from your investment.

For know-how . . . for dependable equipment . . . for undivided responsibility . . . come to Westinghouse and be *sure!* Call your nearest Westinghouse office or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-94854

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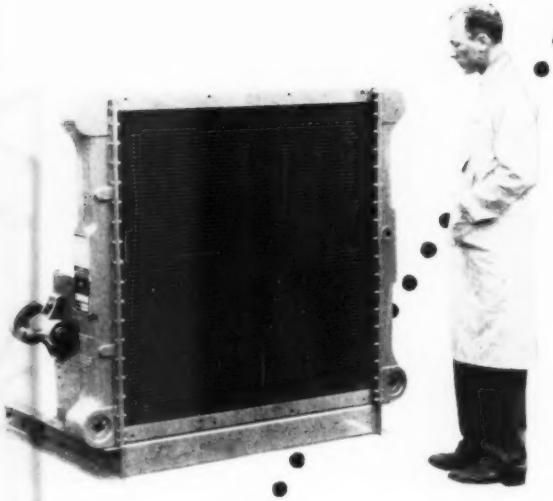
EQUIPMENT FOR THE PETROLEUM INDUSTRY

Gas, Gasoline, Diesel Engine Applications

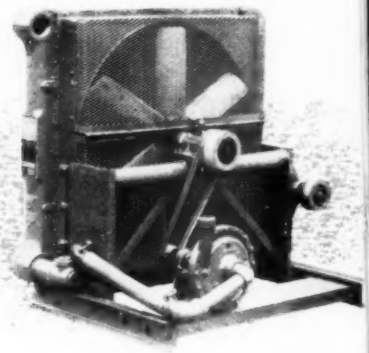
YOUNG Jacket Water Coolers



Standard Series Jacket Water Cooler, front view.

We stock them at central points in cooling capacities to handle engines from 25 h.p. to 100 h.p. Other capacities and or types available promptly.

See your near-by Jones & Laughlin Supply store or write us at Tulsa for Catalog No. 1349 on YOUNG Jacket Water Coolers, plus ratings, specifications, and other details.



Rear view of Standard Series Jacket Water Cooler showing basic unit with pump, fan, drive pulley and idler pulley.

"... here's MY warehouse!"

Jones & Laughlin Supply Company

J&L STEEL

Subsidiary of Jones & Laughlin Steel Corporation

General Offices: TULSA, OKLAHOMA

82 Stores 17 Sales Offices 6 Resident Salesmen

HOW IT WORKS

Supersonic waves are sent into the material under test. Upon reaching the other side, or upon reflection by a discontinuity, the waves return to their source and are then converted into a high-frequency potential. This potential is amplified by electronic circuits and projected upon the screen of a cathode-ray tube where they may be seen and examined.

Pulse pattern, showing the initial pattern at the extreme left and the reflection from the opposite side at the extreme right. The sweep line indicates no defects.

A typical indication of a defect is illustrated here. By means of calibration, it is now possible to determine both the exact position of the flaw, as well as its size.

Today, Supersonic testing is available on specification for inspecting Grinnell prefabricated piping. By observing the pattern produced by the electron beam on the fluorescent screen, any defects in the base metal, welds, or variations in pipe thickness can be located and measured at a glance.

Grinnell's ultra modern electronic testing can be relied upon to detect hidden flaws in pipe materials, to check unerringly the quality of welds where it picks up types of flaws not revealed by X-ray and gamma ray inspection. In examining bends, this type of testing can measure the degree to which bent pipe thins on the outside and thickens on the inside of the bend, assuring full specified thickness in high temperature, high pressure work.

Non-destructive Supersonic testing is another in a constant succession of new techniques employed by Grinnell to provide prefabricated piping which is safe and dependable . . . which measures up in every way to *rigid* state, national, association and insurance code requirements. It is another reason, too, why it will pay you to think of Grinnell "Whenever Piping Is Involved".

GRINNELL

WHENEVER PIPING IS INVOLVED

GRINNELL COMPANY, INC., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

ON THE MUD LINE

Everything's Under Control

WITH Cameron FLEX-SEALS

The ONLY valve made expressly for mud line service

There is no other valve like the Cameron Flex-Seal. It was designed for one service and one service only . . . drilling mud and similar abrasive fluids which quickly cut out the metal-to-metal seal in ordinary general purpose valves.

The inside story of the valve that has revolutionized mud line manifolding is presented at right. (Renewable resilient flow-way insert shown in red.) Operators who may not be familiar with its unique design are invited to study this sectional view or, better still, order a few "Flex-Seals" and check their performance under actual operating conditions.

Cameron 1st *name in drilling control*

CAMERON IRON WORKS, INC.

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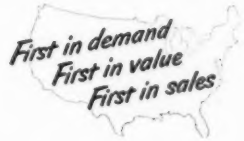
Rugged . . . tough and thrifty, too!

CHEVROLET

ADVANCE-DESIGN

TRUCKS



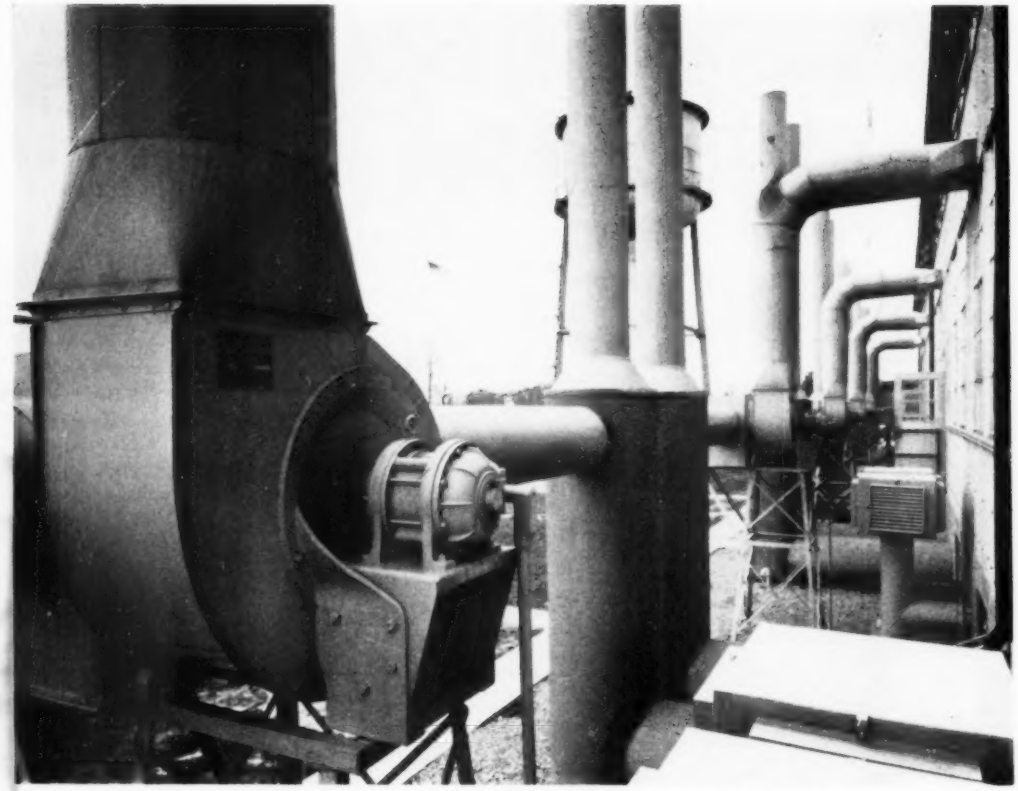
For trucks that are *right* on the job—*always* on the job—see these new Chevrolet trucks. They're able to carry the loads you handle, and able to *keep on* carrying them through tough job after tough job. They're economical and easy to handle, too . . . loaded with new features that pay off for you on *every* job. Features like the new self-energizing brakes for more *stopping* power. And like Chevrolet's Dual-Shoe parking brake . . . engineered for greater *holding* power. Here are trucks that offer important new comfort features. Ventipanes for controlled ventilation, and new cab seats for more riding comfort. In every way, these Chevrolet trucks are right for your job. See them at your Chevrolet dealer's now.

CHEVROLET DIVISION OF GENERAL MOTORS
DETROIT 2, MICHIGAN

CHEVROLET

ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR — for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSIONS—for fast, smooth shifting • HYPOID REAR AXLES—for dependability and long life • NEW TORQUE-ACTION BRAKES—for light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—for medium-duty models • NEW TWIN-ACTION REAR BRAKES—for heavy-duty models • NEW DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • NEW CAB SEATS—for complete riding comfort • NEW VENTIPANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGN BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.



"Buffalo" Limit-Load Fans Exhausting From 1300 h.p. Booster Engines on Main Pipe Line

"Buffalo" FANS ARE PERMANENT ONES!

. . . and this job *calls* for fans that can keep delivering a high level of performance! It's a continuous service job—year in, year out—in the booster stations on oil and gas lines. And "Buffalo" Fans are ideal for the service. They are a medium-speed, high-efficiency design. They are non-overloading. Their specially formed scroll, their double curved rotor blades and directional inlet vanes are features that make "LL" Fans the choice for the big air jobs. You can pick from a wide variety of arrangements and capacities (600 to 500,000 cfm). For a *permanently* satisfactory system, put "Buffalo" Limit-Load Fans in it! Write for Bulletin 3737, for complete data.

"Buffalo" FIRST FOR FANS

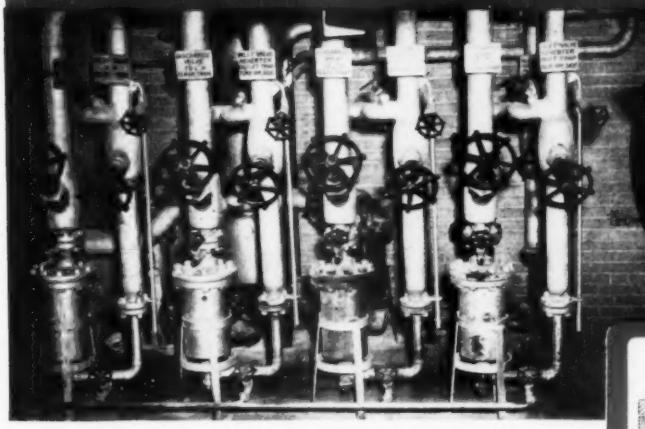
BUFFALO FORGE COMPANY

525 BROADWAY BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Branch offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

FORGED STEEL steam traps



List of Materials

CAP and BODY FORGINGS:*
Up to 600 psig—S.A.E. 1030 steel
600 to 900 psig—ASTM F-1 moly-steel
900 to 1500 psig—ASTM F-7 chrome moly-steel

VALVE AND SEAT:
Chrome steel, heat treated

BUCKET and VALVE LEVER ASSEMBLY:
18-8 Stainless Steel

BOLT and NUT SET:*
Bolts Class C, 125,000 lbs. tensile
Nuts, hex, semi-finish, S.A.E. 1030

GASKET:*
Compressed graphited asbestos

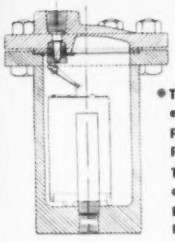
*Does not apply to No. 3211 nor No. 913

1. FOR HIGH PRESSURE SERVICE — engineers responsible for the design or operation of high pressure, high temperature steam plants can specify with confidence Armstrong Forged Steel Steam Traps to provide completely automatic condensate drainage throughout. These traps are "standard" in leading power stations throughout the entire world where they are used for draining headers, desuperheaters, soot blowers and other drip points at pressures as high as 2400 psig! These traps always open when filled with condensate and there is no steam loss under no-load conditions. Safety and dependability are assured through use of modern materials, highest quality workmanship and critical inspection.

2. FOR ALL-STEEL INSTALLATIONS — Armstrong Forged Steel Traps also ideally meet the increasing demand in power plants, refineries and general industry for all-steel fittings on lower pressures (up to 250 psig) because they are light in weight and surprisingly low in price. They provide the maximum in safety, dependability, shock and fire resistance.

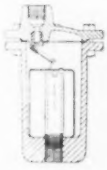
● FOR COMPLETE DATA ask for the 36-PAGE ARMSTRONG STEAM TRAP BOOK or see our catalog in Sweet's.

ARMSTRONG MACHINE WORKS
868 Maple Street, Three Rivers, Michigan

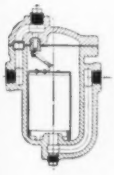


● **Traps with screwed connections for pressures to 900 psig.**

Traps with flanged connections for pressures to 2400 psig.



● **No. 3211 trap for pressures to 250 psig, only $20.00**

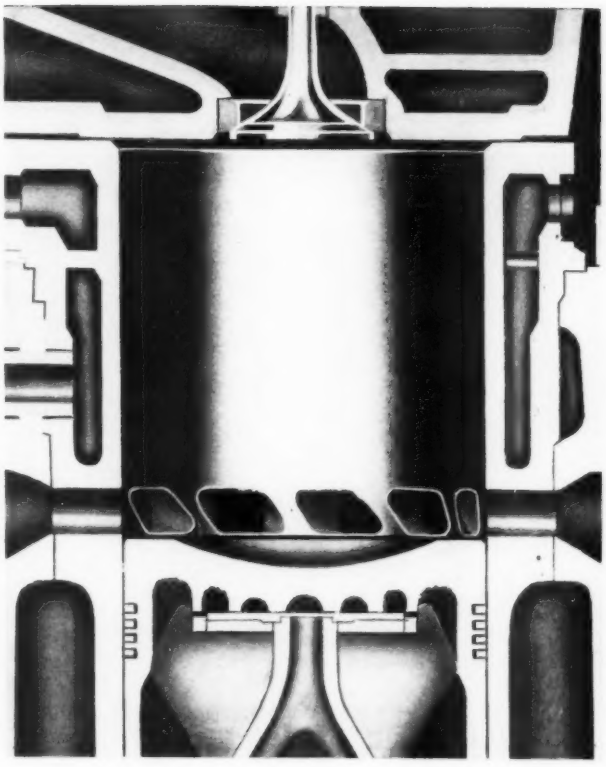


● **Side inlet cast steel trap for pressures to 600 psig, screwed or flanged connections.**

ARMSTRONG STEAM TRAPS

IT'S THE

Biggest News in Gas-Engine Compressors



The *vital power center*

that cuts down-time and increases efficiency in many gas and petroleum-processing services

For the first time, a vastly superior type of scavenging has been applied to compressor engines.

Worthington's timed scavenging system, built into the uniflo UTC-16, gives advantages far beyond any previous method.

A Thoroughgoing "Clean Sweep"

Here are some of the features of this new system concentrated in the "vital power center" illustrated above:

Complete removal of exhaust gas . . . more thorough charging with gas and air . . . positive timing for optimum combustion . . . effective supercharging . . . low operating temperature preventing carbonization . . . uniform cylinder temperature resulting in equal wall stress eliminating harmful stresses.

Many Uses . . . Many Sizes

While designed primarily as a pipeline gas-engine compressor, the UTC-16 is suitable for many other services, including: pressure maintenance on oil wells . . . in natural gasoline plants . . . in oil refineries, for solvent extraction, vapor recovery, recycling and stabilization of gases . . . in petrochemical processing of products made from natural gas under pressure . . . in many refrigeration applications.

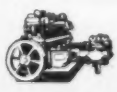
The Uniflo UTC-16 is built in sizes ranging from 800 to 2000 hp. For further proof that *there's more worth in Worthington*, contact our nearest Branch Office, or write the Worthington Pump and Machinery Corporation, Engine Division, Buffalo, N.Y.

WORTHINGTON

ENGINE COMPRESSORS

EK.1.2

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON



Are you turning in all your SCRAP?

Don't wait for "George" to do it

IF you are a steel user, this important job of getting more scrap back to the mills is directly up to *you*. You just cannot afford to sit idly by while the scrap shortage gets worse. For unless everyone really pitches into this job of digging out all the scrap possible, steel production is bound to suffer, and every steel user, in more or less degree, will suffer too.

More scrap means *more* steel—it's as simple as that.

Right now some mills have only a bare two-days' supply of scrap on hand. Others have even less. Some steel-making furnaces already have had to shut down for lack of scrap. The situation is serious. Only you can help improve it.

By turning in every piece of worn-out equipment, every obsolete tool and machine, in fact every pound of iron and steel scrap you can comb out of your plant, you'll be helping relieve the worst scrap shortage since Pearl Harbor days . . . and the steel industry will be able to produce more of the steel you need.

Remember—it takes at least one-half ton of scrap to make one ton of steel. To maintain steel's present high production schedules requires more than 1400 carloads of industrial scrap *every* day. So turn in your scrap—ALL your scrap—and keep the mills rolling. This is more than a shortage. It's an emergency that vitally concerns you—and us—and the Nation.

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

USS

1-1348

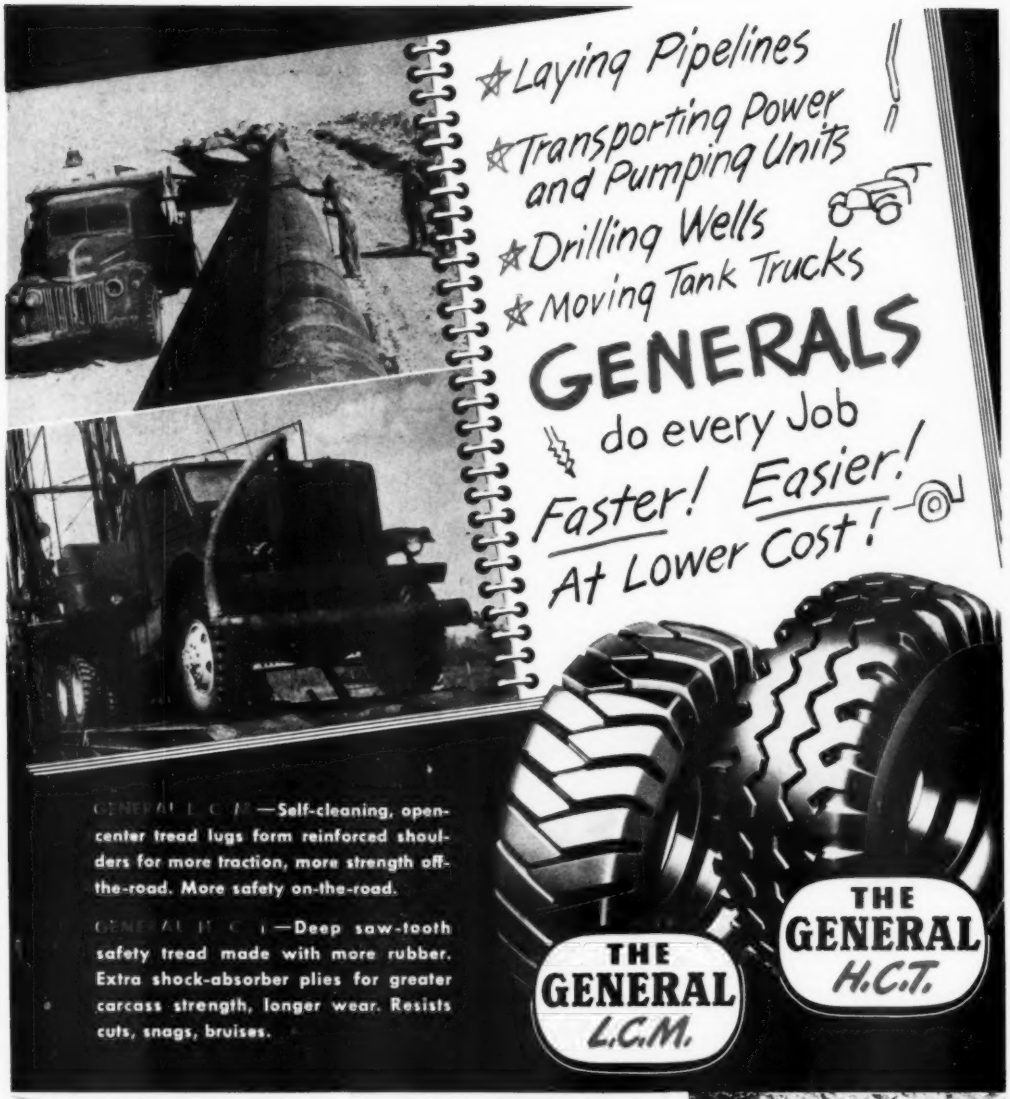
This page would ordinarily be used to tell you about

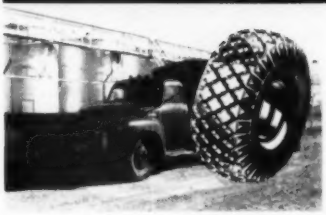
NATIONAL SEAMLESS
Drill Pipe, Casing and Tubing

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL


★Laying Pipelines
★Transporting Power and Pumping Units
★Drilling Wells
★Moving Tank Trucks
GENERALS
do every Job
Faster! Easier!
At Lower Cost!
GENERAL L C M —Self-cleaning, open-center tread lugs form reinforced shoulders for more traction, more strength off-the-road. More safety on-the-road.
GENERAL H C T —Deep saw-tooth safety tread made with more rubber. Extra shock-absorber plies for greater carcass strength, longer wear. Resists cuts, snags, bruises.
THE GENERAL L.C.M.
THE GENERAL H.C.T.



GENERAL ALL-GRIP—For lighter trucks, the General All-Grip's sturdy tread blocks give extra traction on unimproved roads.

GENERAL NON-DIRECTIONAL CLEATED—Extra traction forward or backward on this broad lugged, self-cleaning tread. Best for dump trucks.

GENERAL INDUSTRIAL PNEUMATICS—Wide-base small tires for extra cushioning, more flotation. Extra protection for equipment.

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT

RAY-MAN 635-D BRAKE BLOCKS

(Key-Lok or Bolt-on)

Here's a brake block that gives long, *dependable* service even under the heaviest strings of pipe . . . yet feeds off so smoothly and evenly that it helps substantially to speed drilling and cut costs.

Reinforced with brass wire inserts at the back, each Ray-Man 635-D Brake Block is woven of unusually large asbestos yarns. Fully impregnated with a specially developed saturant.

Ray-Man 635-D Blocks resist bleeding at high temperatures. Won't glaze drums. Won't carbonize even when heavily overloaded!

Key-Lok attachment, too! Key-Lok, the R/M development that makes it possible to *slide* blocks on and off, is optional with Ray-Man 635-D Blocks. This feature saves relining time . . . eliminates bolt holes, providing greater friction surface and longer wear. No danger of scoring drums with bolt heads. Also available drilled and countersunk for bolt attachment.

RAYBESTOS-MANHATTAN, INC.

WAREHOUSE STOCK: 2809 Taylor Street, Dallas, Tex.

OFFICES:

445 Lake Shore Drive, Chicago 11, Ill. • 4651 Pacific Blvd., Los Angeles 11, Calif.

Factories: Bridgeport, Conn. • Manheim, Pa. • Passaic, N.J. • No. Charleston, S.C.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Mechanical Rubber Products • Rubber Covered Equipment • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

R M

2 READINGS at a 40 SECOND INTERVAL

Only **DRIFT INDICATOR WITH THIS FEATURE**

Eastman

NEW MECHANICAL SELF CHECKING DRIFT INDICATOR

Yes, there are other drift indicators. But Eastman, and only Eastman, has the 40-second interval self-checking feature.

No batteries, light bulbs or photo-sensitive discs are used. This drift indicator's operation is COMPLETELY MECHANICAL.

Simple to operate — accurate in its recordings — rugged in construction.

The instrument can be go-deviled or lowered into the hole on any conventional line.

Operators may contract for this instrument on a daily or term rental basis at a nominal charge. Call the nearest Eastman office for details and a demonstration.

22 offices for your convenience — Consult your telephone directory.

EASTMAN OIL WELL SURVEY COMPANY

LONG BEACH • DENVER • HOUSTON

SERVICE LEDGER
1901-1951

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- ARGENTINE MINISTRY OF WAR
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- CIE. FRANCAISE DE RAFFINAGE
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- CITIES SERVICE OIL CO.
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- SOCIETE GENERALE DES HUILES DE PETROLE
- SOCIETE INDUSTRIELLE BELGE DES PETROLES
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Up from Lake Charles...with Cities Service!

For the past decade, during Cities Service's wide and rapid expansion of its petroleum processing facilities, Kellogg has worked closely with this refiner in the design and construction of several vast undertakings.

First job was a mammoth refinery at Lake Charles, Louisiana. The first complete modern refinery to be built from the ground up, it included three catalytic crackers...and alkylation, deasphalting and crude topping units as well as all plant-site facilities. Concurrently, a butadiene plant was built on an adjacent site.

Immediately following World War II, Kellogg undertook the complete modernization of the Cities Service East Chicago 35,000 BPD refinery . . . engineering and constructing new Fluid catalytic cracking, delayed coking and light ends fractionating units as well as revamping other facilities.

Today sees Kellogg at Ponca City for Cities Service. It is another major modernization job with Fluid catalytic cracking as the principal new process.

THE M. W. KELLOGG COMPANY

A SUBSIDIARY OF PULLMAN INCORPORATED

for fifty years an integral part of processing history

NEW YORK JERSEY CITY LOS ANGELES TULSA HOUSTON TORONTO LONDON PARIS

Portrait at

This year is Kellogg's fiftieth of service to industry. At this time naturally, as a group of men—known collectively to the modern business world as The M. W. Kellogg Company—we can think back nostalgically. We can remember the chimney stacks

"Firm Foundation for Every Task"

Camera "portraits" of M. W. Kellogg today, appearing in preceding issues of this publication, have reviewed the research, development, process design and design engineering phases of the Kellogg operation.

This month, the camera looks at the vital task of collecting, evaluating and disseminating Technical Data and Standards . . . and then indicates how this basic work influences Procurement practice and efficiency.

1. *THE PRACTICE OF ENGINEERING* is similar to most professional operations . . . highly individual in its approach to problems. But unless *the best* of each engineer's approach is captured for the benefit of others, much individual effort would be repeated on the same problems. Thus, at Kellogg there is a special *Standards Group* . . . engineers, whose sole function is to record the best methods for solving many problems.

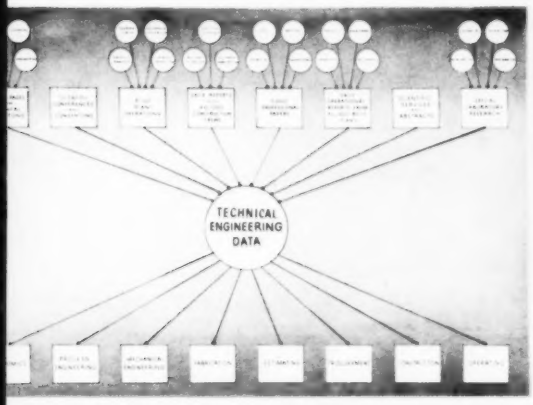
4. *CONSTANT CHECKING* and re-checking of design specifications is the responsibility of all Kellogg engineers who regularly visit operating units. Such visits are scheduled when possible for turn-around periods so that the company's engineers can inspect process equipment and personally observe how Kellogg design stands up in actual practice.

5. *DESIGN STANDARDS* and detailed specifications are obviously most important in the design function of the company. But they also contribute greatly to the efficiency of such a major function as *Procurement*. Kellogg's procurement force is a large one, issuing more than 60,000 purchase orders a year, on the average. The availability of detailed specs on all items regularly purchased speeds the procurement job measurably.

Fifty... no 7

KELLOGG
M W
1901 1951
50th Anniversary

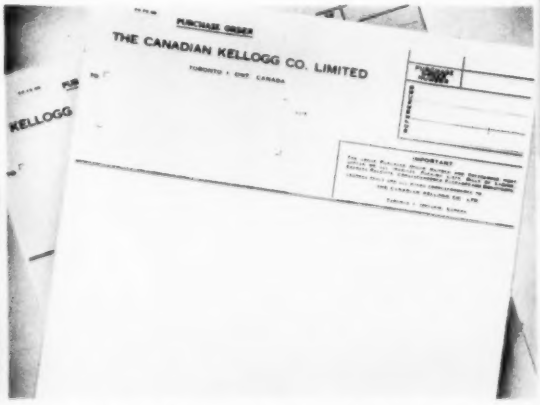
we built in 1901 . . . the first crude vessels for oil refiners in the 'teens . . . our first combination unit. The forty-odd Fluid cat crackers built in these years. But, after all, The M. W. Kellogg Company is only a factor as it is able to serve industry today. For that reason, we are presenting this series of monthly camera studies which document our belief that a truly integrated organization can better serve industry to achieve greater earning power. This is No. 7 in the series.



2. *THESE BEST METHODS* are then made available to the entire engineering organization in the form of "Standards." Kellogg design standards, of course, embrace recognized codes, but they also project and amplify the codes for more efficient engineering and operation. Another group of engineers, with a supporting staff, specialize exclusively in the gathering, evaluation and dissemination of *Technical Data*.

3. *THIS SIX VOLUME SET* is literally priceless. While it includes much information that is available to the entire engineering fraternity, it also includes much more that is exclusive. It contains Kellogg's own research and development data, *plus* the summarized analyses of operating data from the more than 450 process units designed by the company during modern processing history.

6. *ORGANIZATION OF THE PROCUREMENT GROUP* closely parallels that of the Engineering Departments. Buyers specialize in specific phases such as vessels, equipment, instruments, etc., and in classes of materials and services. Thus, each specialized buyer has the direct support of the technical knowledge of the *matching* engineering group.

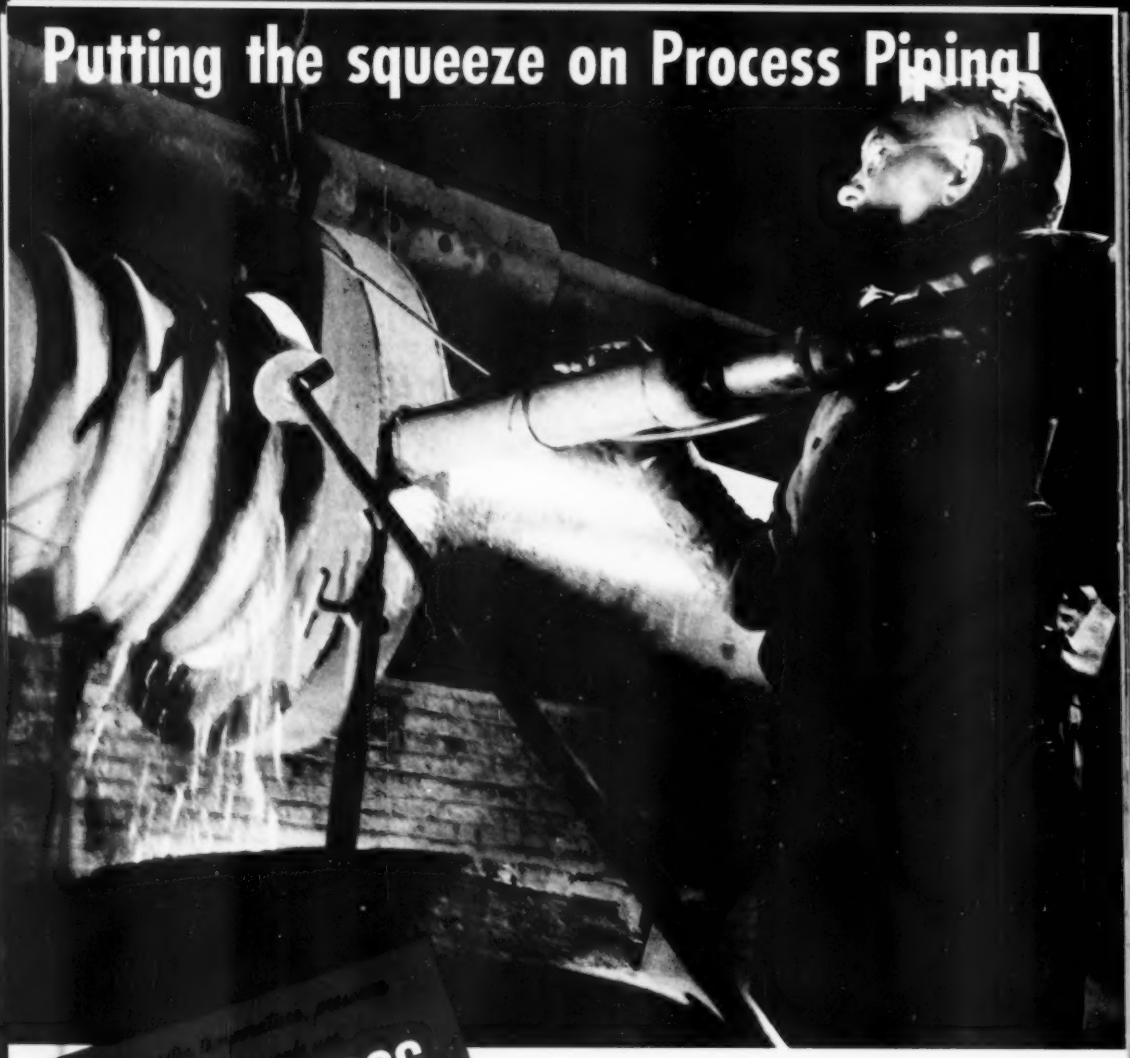


7. *KELLOGG PURCHASING SPECIALISTS*, because of their close integration within a complete engineering-fabricating-contracting organization, are in an advantageous position to weigh delivery dates against price. Correct decisions between these factors are particularly important when they govern the starting date of plant *earning power*. Worldwide facilities also speed procurement and consequently project completion dates.

NEXT MONTH

. . . in the eighth in this series of camera studies of M. W. Kellogg today . . . you will see how Kellogg's original bent for manufacturing serves the company today in meeting engineers' toughest "specs".

Putting the squeeze on Process Piping!



M. W. KELLOGG

This special machine put the squeeze on the first 30" O.D., chrome-moly piping to be successfully corrugated. The Kellogg technique of incremental heating and working employed in this operation has many other advantageous applications in fabrication of refinery equipment.

Pressure Vessels
Vacuum Vessels
Fractionating Columns
Drums and Shells
Heat Exchangers
Process Piping
Hi-pressure—Hi-temp Power Piping
Bends and Headers
Giant One-Piece Bends
Forged and Welded Fittings
Radial Brick Chimneys

Special Studies of unusual problems such as stress corrosion and graphitization to assure long life and low maintenance.

Exclusive Equipment for accurately analyzing stresses in piping and providing unique data for critical installations.

Top Welding Performance in shops and in the field by welders accustomed to working under X-ray checks.

Metallurgical Research by recognized specialists who have made major contributions in this field.

Complete Facilities for the fabrication of steel products from simple forgings to specially cast bimetallic devices.

Rigid Quality Control, devised by specialists, including chemical and micro analyses as well as mechanical and non-destructive testing.

NEWS FOR OPERATORS IN WESTERN CANADA!

Canadian Kellogg Company has established complete shop facilities for the fabrication of all types of piping at EDMONTON in Alberta Province. Inquire directly or through any Kellogg office.

The M. W. Kellogg Company *(A Subsidiary of Pullman Incorporated)* **New York, Jersey City, Los Angeles, Tulsa, Houston, Toronto, London, Paris**

WELDOLETS

WELDING FITTINGS FOR ANY PIPING SERVICE

NATURAL GAS COMPRESSOR STATION PIPING CONSTRUCTED ECONOMICALLY AND EFFICIENTLY USING WELDOLET WELDING FITTINGS THROUGHOUT

This installation, together with a number of important applications of WeldOlet Welding Fittings in various types of service is shown in the new Bonney W-3 WeldOlet Catalog.

The completely new Bonney catalog will furnish descriptive, dimensional information and installation instructions. The technical section discusses graphically how WeldOlet Welding Fittings are the quickest, easiest and most economical method of reinforcing and maintaining 100% pipe strength at branch connections in accordance with code regulations.

Write for your free copy to: **BONNEY FORGE & TOOL WORKS** 346 Green St., Allentown, Pa.

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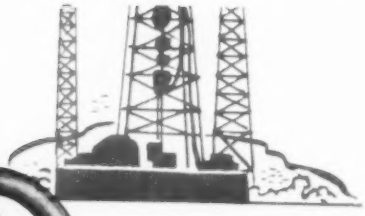
FLEXIBILITY WITH SAFETY



RAY-MAN ROTARY HOSE

"Never thought I'd see a rotary hose so easy to handle and make up on the rig."

That's what a tool pusher says about the super flexibility of Ray-Man Rotary Hose. To his boss, it means longer life for the hose and couplings, because it escapes a lot of damage in handling. It hangs steady in the derrick; cushions pump pulsations. Oil-proof tube permits drilling-in with oil or oil-base mud.

The Built-In Coupling has a leak-proof "Lip-Lok" Seal for extra safety. Specifications are described in Bulletin 6898, mailed on request. Ray-Man Rotary Hose is distributed by National Supply Company in all principal oil fields.

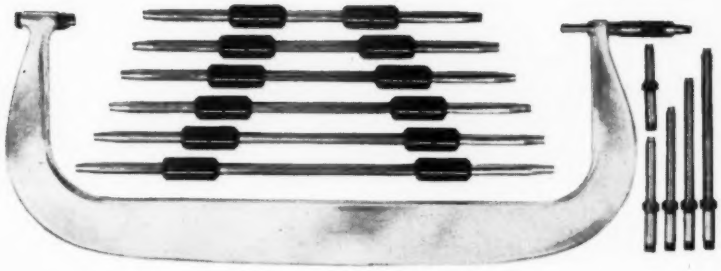
Hose, V-Belts, Transmission Belts and Packing, engineered for all phases of the oil industry, are described in Catalog 6903. Write for your copy.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

The TUMICO Bar Micrometer



SHALLOW, TUBULAR FRAME FOR PRECISION LONG-SPAN MEASUREMENT!

The shallow frame of the Tumico Bar Micrometer slips in where frame clearance is too small for ordinary micrometers. The hollow steel frame cuts weight in half . . . makes precision measurements easy, even in the largest sizes. It is made in over 30 models ranging from 6″ to 168″. The Tumico Bar Micrometer can be furnished with either adjustable mandrels or sliding bar anvil.

All Tumico micrometers, gages and measuring instruments are fully and easily adjustable for wear. Skilled engineering has reduced weights up to 50%. "Feather touch" feel and balance speeds measurements and assures accuracy.

Tumico instruments control production for many of America's largest manufacturers. Consult us for special production gages, calipers, alignment instruments, etc. Catalog sent free on request.

TUBULAR MICROMETER CO.
ST. JAMES, MINNESOTA

FEATHER TOUCH

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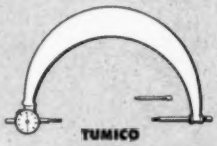
FOR EVERY JOB

TUMICO

PRECISION MEASURING INSTRUMENTS

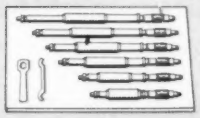
TUMICO BAR MICROMETERS
Provide a wide range of precision measurement with low investment. 30 models from 6″ to 168″.



TUMICO DIAL INDICATOR GAGES
Quick vision Tumico micrometers and gages to meet your special measurement requirements.

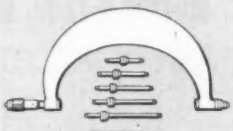
TUMICO MICROMETER SETS
Complete sets for a broad range of accurate measurement operations. From 0″ to 30″ in 1″ steps.

TUMICO VERNIER CALIPERS
Precision made. Accurate, clearly etched graduations and numerals. 24 models from 6″ to 48″.

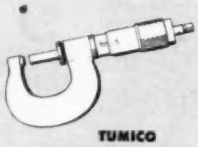


TUMICO INSIDE MICROMETERS
Tubular construction; insulated from hand heat for full precision. 37 models from 1″ to 106″.

TUMICO POST GAGES
Precision micrometer or dial indicator instruments adaptable to a wide variety of uses. 10 models.

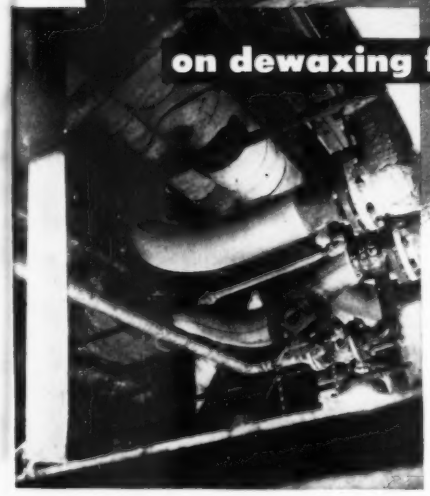


TUMICO OVER-THE-BAR MICROMETERS
Precision bore measurement without removing boring bar. 11 models from 3″ to 28″.



TUMICO HEAVY-DUTY MICROMETERS
Extra rugged for hard usage under severe conditions. 4 models from 0″ to 4″.

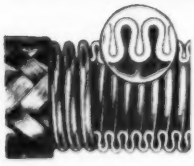
For troublesome connections . . .



CMH
FLEXIBLE METAL HOSE offers the economical, dependable solution

Scores of troublesome connection problems where there is movement between parts, misalignment, vibration or expansion and contraction are effectively solved with CMH Flexible Metal Hose. Manufactured in a variety of types and a variety of metals, CMH Flexible Metal Hose is available for pressures from vacuum to 12,000 psi (burst) and for temperatures from sub zero to 1600° F.

If you do not already have literature describing the CMH line of flexible metal hose products, write for it, today, mentioning the types of connection problems you have.



CMH corrugated metal hose is manufactured in steel, bronze, stainless steel and other alloys and is available with or without metal braid covering. Convoluted hose, conduits, expansion joints, bellows and specialty items are also included in the CMH line.

Flexon identifies CMH products that have served industry for over 49 years.

CHICAGO METAL HOSE Corporation

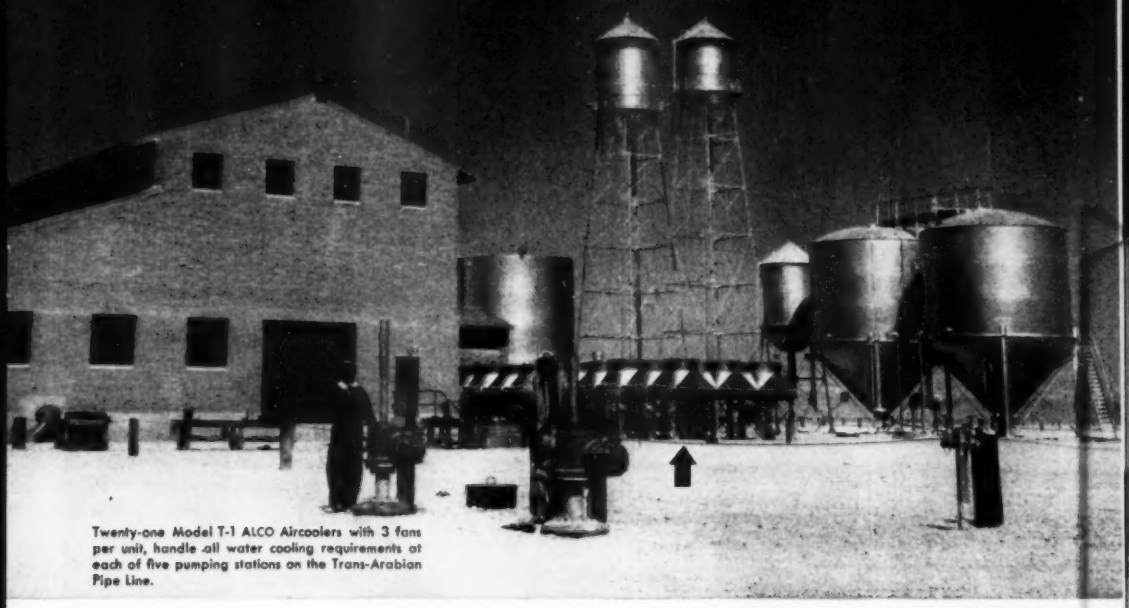
1345 S. Third Ave. • Maywood, Ill. • Plants at Maywood, Elgin, Rock Falls, and Savanna, Ill.
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ont.

CMH

ONE DEPENDABLE SOURCE
for every flexible metal hose requirement

Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals • Expansion Joints for Piping Systems
Stainless Steel and Brass Bellows • Flexible Metal Conduit and Armor • Assemblies of These Components

MIRACLE IN ARABIA



Twenty-one Model T-1 ALCO Aircoolers with 3 fans per unit, handle all water cooling requirements at each of five pumping stations on the Trans-Arabian Pipe Line.

ALCO Aircoolers use Hot Desert Air to Cool Water for Tapline Pumping Stations

Cooling jacket water and lube oil cooling water for engines and generators at the pumping stations of the Trans-Arabian Pipe Line is a real engineering feat. Ground or surface water in expendable quantities is not available and although the ambient temperatures range as high as 122° F., ALCO Aircoolers proved to be the economical answer.

ALCO Aircoolers handle all of the water-cooling needs for Tapline pumping stations except at the terminal—at altitudes up to 2700 feet above sea level —a total of 4770 G.P.M.

Dependability of ALCO Aircoolers was an important factor in their selection for this installation. The remote location of these pumping stations called for rugged equipment which would require a minimum of maintenance attention and withstand the ravages of periodic wind and dust storms.

There is little probability that the conditions in connection with your cooling needs are as severe as this one on the Arabian desert. You can be sure, however, that ALCO Aircoolers can solve your problem, too. Write today for a copy of the ALCO Aircooler booklet or see your nearest ALCO Sales Engineer at Chicago, Dunkirk, Houston, Kansas City, Los Angeles, New York or Tulsa. Plants: Dunkirk, New York and Beaumont, Texas.

ONLY ALCO HAS THE BIG 5

1 Low Cost
2 Flexible Design
3 Efficient Performance
4 Easy Maintenance
5 Quick Installation

ALCO

ALCO Products Division
AMERICAN LOCOMOTIVE COMPANY

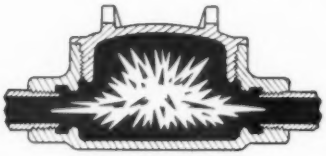
In step with tomorrow—ALCO AIRCOOLERS, Heat Exchangers, Evaporators, Feedwater Heaters, Pressure Vessels, Pipe

Explosion-Proof CONDULETS*

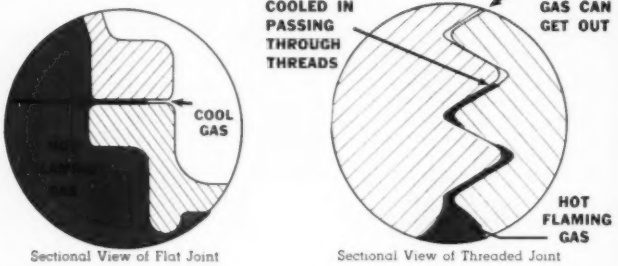
give you PROTECTION where flammable atmospheres are present or likely to be present

. . . because every explosion-proof CONDULET . . .

1 Withstands the force of an internal explosion



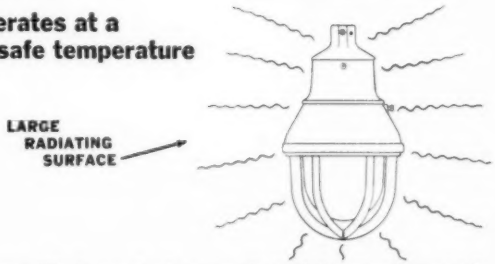
2 Has flametight joints



Sectional View of Flat Joint

Sectional View of Threaded Joint

3 Operates at a safe temperature



All Crouse-Hinds explosion-proof electrical equipment is built to exceed Underwriters' Laboratories requirements.

Thousands of explosion-proof and dust-tight CONDULETS are listed in Crouse-Hinds CONDULET Catalog.

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*CONDULETS are made only by CROUSE-HINDS

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THE CENCO-MEGAVAC PUMP

in a single mechanical unit produces high ultimate vacuum with high pumping speed for fractional distillations, temperature and pressure measurements and other laboratory or pilot plant operations which require fast initial evacuation. Precision machining of internal parts, lever-action vanes and positive sealing rings assure long life and efficient, dependable service. Speed at 1 micron, 357 ml/sec; vacuum, 0.1 micron or better.

If your vacuum system requires high or low speed evacuation let us recommend an efficient pumping unit. Fifty years experience in engineering and manufacturing high vacuum pumps is yours for the asking.

Write Dept. T for Engineering Bulletin 10 High Vacuum Equipment

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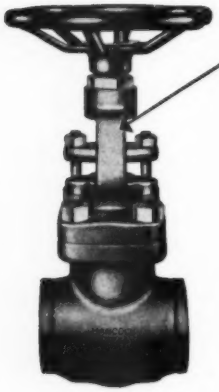
NEW GENERAL PURPOSE

800# Hancock Gate

STEEL WELDVALVES

These new 800# Hancock General Purpose Steel Gate Weldvalves are the product of nearly three-quarters of a century of valve engineering and manufacturing experience. Built into them are exclusive design and operating features that assure extra years of top performance in the severest services.



800# HANCOCK STEEL GATE WELDVALVES

Bolted Bonnet Design

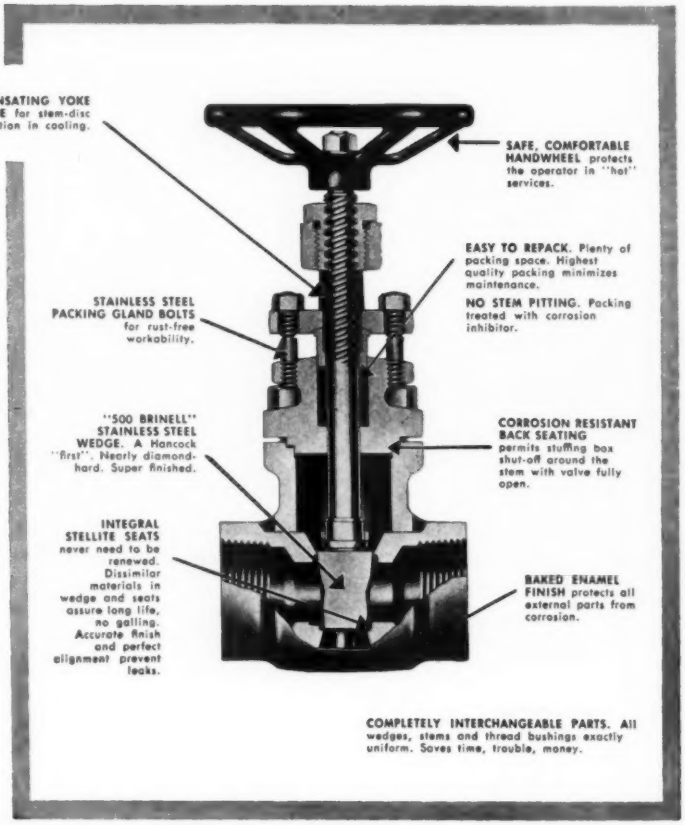
Sizes: $1\frac{1}{4}$" thru 2"

Screwed Ends . . . Socket Weld Ends . . . Flanged Ends

For *All* Pressures Up to 800 P.S.I. at 750° F.

O.W.G. 2000# 100° F.

General Purpose Hancock Steel Gate Weldvalves cost no more than ordinary valves — despite their recognized trouble-free dependability and long-life economy. Your nearby Hancock Valve Distrjbutor has the facilities and the stocks to give you fast, efficient service. Get the best for your money. Phone him.

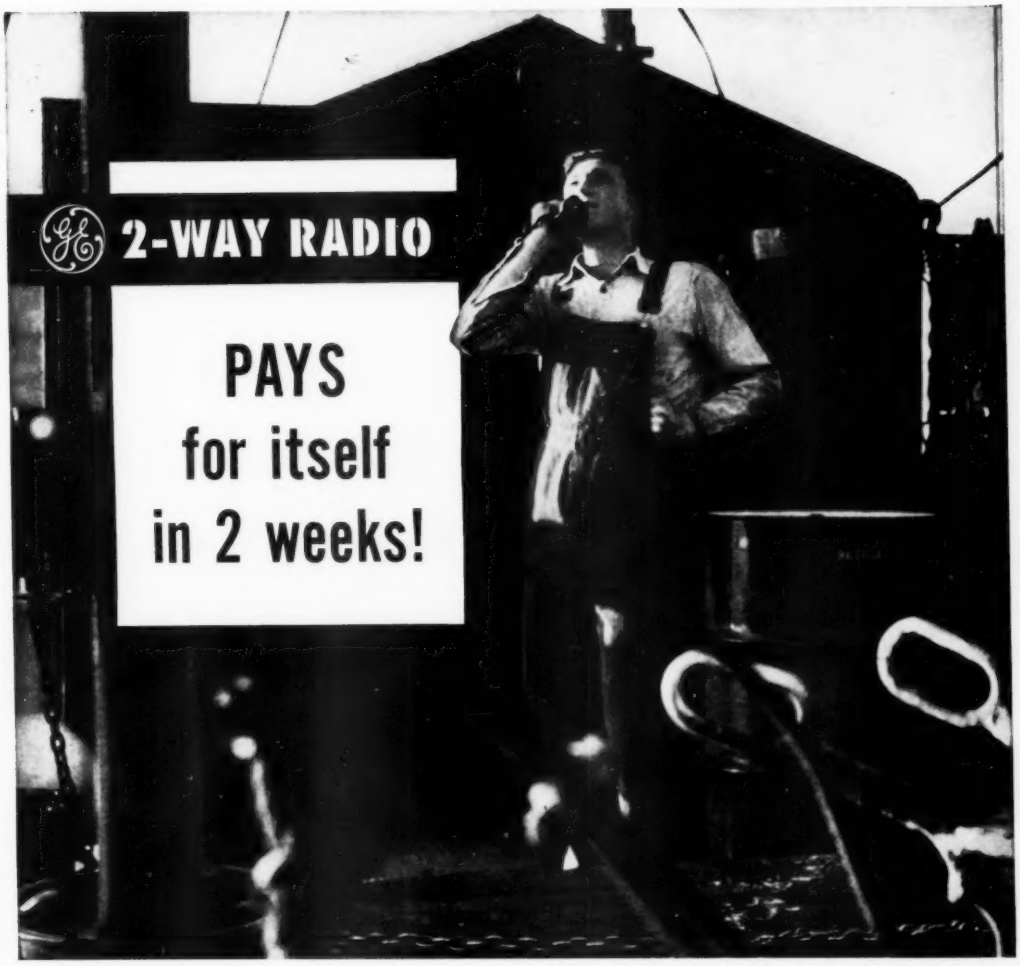

COMPENSATING YOKE STRUCTURE for stem-disc contraction in cooling.
SAFE, COMFORTABLE HANDWHEEL protects the operator in "hot" services.
EASY TO REPACK. Plenty of packing space. Highest quality packing minimizes maintenance.
NO STEM PITTING. Packing treated with corrosion inhibitor.
STAINLESS STEEL PACKING GLAND BOLTS for rust-free workability.
"500 BRINELL" STAINLESS STEEL WEDGE. A Hancock "first". Nearly diamond-hard. Super finished.
CORROSION RESISTANT BACK SEATING permits stuffing box shut-off around the stem with valve fully open.
INTEGRAL STELLITE SEATS never need to be renewed. Dissimilar materials in wedge and seats assure long life, no galling. Accurate finish and perfect alignment prevent leaks.
BAKED ENAMEL FINISH protects all external parts from corrosion.
COMPLETELY INTERCHANGEABLE PARTS. All wedges, stems and thread bushings exactly uniform. Saves time, trouble, money.

When Hancocks go in, valve costs go down

HANCOCK VALVES

A product of MANNING, MAXWELL & MOORE, INC. WATERTOWN 72, MASSACHUSETTS

MAKERS OF "HANCOCK" VALVES, "ASHCROFT" GAUGES, "CONSOLIDATED" SAFETY AND RELIEF VALVES, "AMERICAN" ELECTRICAL AND INDUSTRIAL INSTRUMENTS, BUILDERS OF "SHAW-BOX" CRANES, "BUDGIT" AND "LOAD LIFTER" HOISTS AND OTHER LIFTING SPECIALTIES.



Calling in a morning report by G-E radio to headquarters 25 miles away. Photo taken on a Reading & Bates, Inc. rig near Goldsmith, Texas.

To a driller, hours are dollars. In a normal week's operation, General Electric 2-way radio on a Reading & Bates drilling rig saves eight hours of shutdown time. This saving will more than pay for the cost of one mobile installation in 2 weeks!

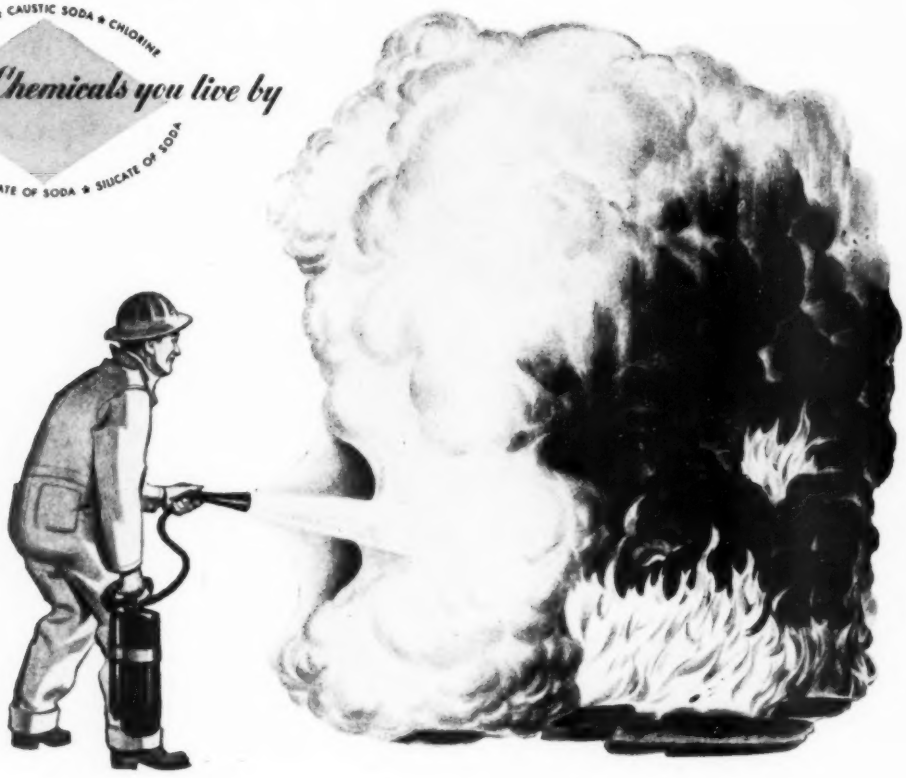
When ordering supplies from the field, radio will eliminate useless travel time, increase the efficiency of your entire field operation. Mobile units in pushers' cars and homes keep them in touch with rigs 24 hours a day, permit close field control.

CALL YOUR G-E COMMUNICATIONS MAN

Ask him about General Electric's *narrow band* equipment particularly suited to the oil industry. You can reach him at the G-E office near you. Meanwhile, write us for free information kit. *General Electric Co., Section 881-16, Electronics Park, Syracuse, New York.*

You can put your confidence in—

GENERAL ELECTRIC



ANTIDOTE from DIAMOND

Bicarbonate of Soda is a great antidote for upset stomachs and unwelcome fires. DIAMOND ALKALI makes "bicarb" for many purposes. Actually tons of this essential DIAMOND chemical go into dry and acid type fire fighting compounds. Another DIAMOND chemical, carbon tetrachloride, is the base for fire extinguisher liquids.

In fire protection and in countless other ways, DIAMOND Chemicals serve the oil industry: chlorine and caustic soda for refining, silicates for "cat cracking", chromates for corrosion preventives, soda ash for water softening.

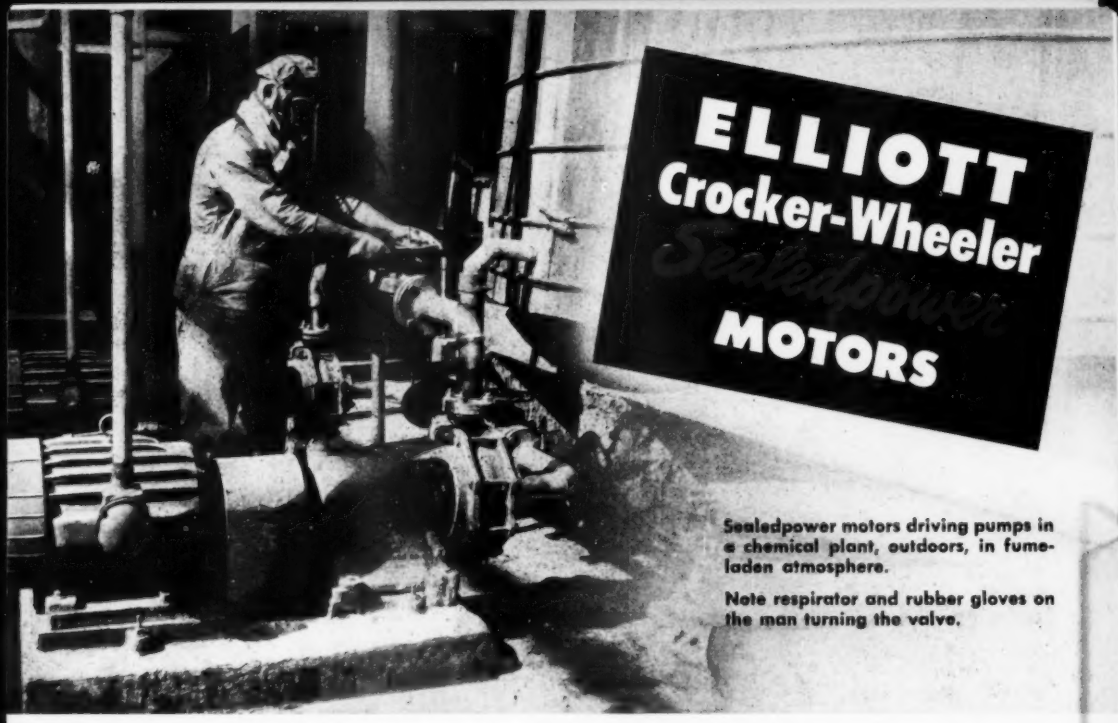
With our future so closely linked with yours, we are building for better and better service to the oil industry. Among other things our Technical Service Staff is at your disposal to assist in any problems you may have in handling, storing or applying the chemicals we produce. Just call your nearest DIAMOND Sales Office or write us direct.

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis, Oklahoma City and Houston. Also representatives in other principal cities.

DIAMOND CHEMICALS FOR THE OIL INDUSTRY

DIAMOND ALKALI COMPANY...CLEVELAND 14, OHIO

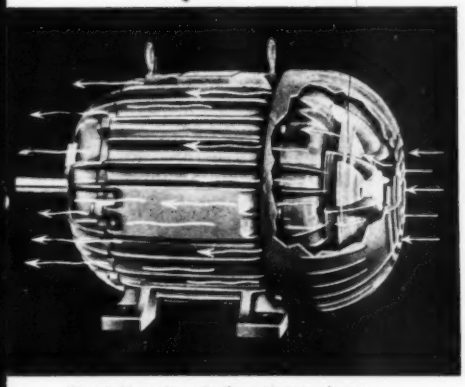
DIAMOND ALKALI CHEMICALS



Sealedpower motors driving pumps in a chemical plant, outdoors, in fume-laden atmosphere.

Note respirator and rubber gloves on the man turning the valve.

They live a Tough Life!



The air blast along the finned housing keeps the sealed-power motor cool and clean.

Working under corrosive chemical fumes so powerful that the operator must wear rubber gloves and a respirator . . . exposed at all times to snow, sleet, rain, flying dust, heat and cold—these motors take it all, and like it.

Consider what "Sealedpower" motors save. They need no housing, for they supply their own — weather-proof and fume-proof. They need no special consideration as to location—anywhere will do, indoors or out. They need mighty little care, for these are the famous Crocker-Wheeler Sealedpower motors, totally enclosed, which more than ten years ago brought to industry the advantages of their finned case, self-cooled and self-cleaned by a directed air blast that blows away both heat and dirt. They are today's answer to today's trend toward outdoor installation. Get the facts—write for the Sealedpower bulletin.

HALF CENTURY OF POWER PROGRESS 1901 EC 1951

ELLIOTT COMPANY • *Crocker-Wheeler Division* • *Ampere, N. J.*

PLANTS AT: JEANNETTE, PA. • RIDGWAY, PA. • AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.

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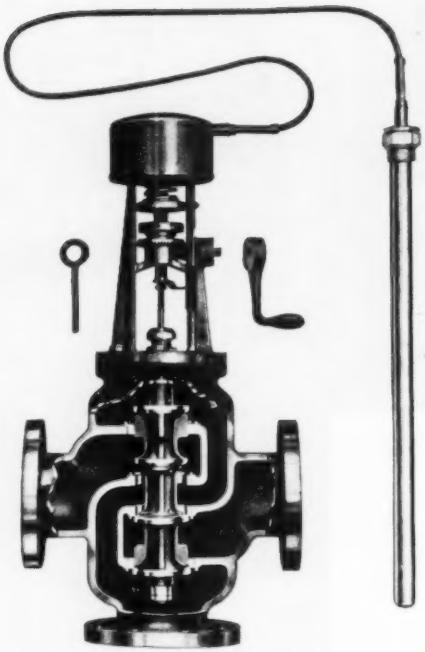
ELLIOTT *Approved* SERVICE SHOPS COVER THE COUNTRY

CW-34

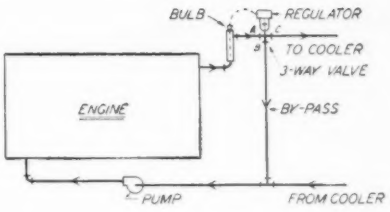
You're a step ahead with ELLIOTT

SYLPHON CONTROLS FOR DEPENDABILITY



No. 923-3WB

No. 539



Automatic insurance against engine troubles!

● **SYLPHON TEMPERATURE REGULATORS** assure positive, accurate temperature control that means *extra* savings. They operate dependably, day and night—safeguard you against the risks of shut-downs—of cracking pistons, cylinder heads and other costly damage.

And—with accurate temperature control, engines get better lubrication. Piston rings require fewer replacements. Fuel and lube oil consumption is cut.

For example, No. 539 Control protects against overheating or low lube oil pressure. If water jacket temperature goes above, or lube oil pressure goes below safe limits, it sounds an alarm—or stops the engine.

No. 923-3WB Regulator is equipped with a 3-way valve which is automatically positioned to direct all or part of the water through a by-pass. It maintains constant volume of water through pump and engine . . . gives quick "warm-up". . . improves performance.

Both controls are ideal for diesel, gas or other internal combustion engines. Self-contained, self-powered, sturdily built for years of service. Easily installed. Get complete details. Send for Bulletin QO-817.

FS

FIRST WITH BELLOWS

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON DIVISION

ROBERTSHAW-FULTON CONTROLS CO. KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

COMPACT... EFFICIENT

PARKERSBURG'S unitized separators are easy to install, require minimum foundation and have all of these superior performance features of the famous Type "S" Horizontal Separators:

No. 5114

- **15 to 20% greater facility for primary separation**
- **Faster discharge of gas-free oil; longer retention of more gaseous liquids.**
- **Incoming fluid broken into largest possible droplets**
- **All entrained liquid removed from gas stream**
- **Skimmer pipe provides additional scrubbing**
- **No-Bleed level controller maintains liquid at any desired level to provide maximum space for gas travel and natural separation.**

PARKERSBURG RIG & REEL COMPANY—Parkersburg, West Va.

• Ask your Parkersburg Representative for complete details about this and other Parkersburg Horizontal Separators.

PARKERSBURG

PRESSURE EQUIPMENT

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

Manufactured in Houston, Texas

WOLVERINE COPPER TUBING *first* ON D.O.

but we're not forgetting YOU

Copper and copper base alloy tubing is specified on many Defense Orders. Wolverine tubing is often selected because it is, as you know, quality-controlled from ore to finished product and, therefore, conforms to the high standards that must be met.

Incidentally, Wolverine has been manufacturing copper and copper base alloy tubing for well over thirty years—for domestic production and in answer to government needs when required.

But like all other manufacturers, we are cognizant of the division of our obligations. Your needs, too, are recognized. Not all the copper tube we produce daily is earmarked for emergency use. The maximum percentage allowed by government regulations is being produced to take care of essential domestic needs—your other needs.

Whatever tube you can get, utilize it to the best advantage. Employ it judiciously and we shall all get along very well until the emergency is over.

WOLVERINE TUBE DIVISION
Calumet & Hecla Consolidated Copper Company
INCORPORATED
Manufacturers of seamless, non-ferrous tubing
1459 CENTRAL AVE. • DETROIT 9, MICH.

Wolverine condenser tubes stocked by
Butler Industries, Inc., 355 So. Fourth St., Beaumont, Texas • Phone Beaumont 5-2351

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Sales Offices in Principal Cities

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PETROLEUM CHEMICALS DIVISION
NEWS

August ★ One of a Series of Interest to the Petroleum Industry ★ 1951

Brakes Relined with a 'BANG'

New Du Pont explosive rivets save time and money in relining brakes. This saving is especially important to operators of heavy-duty trucks that give brakes real punishment.

Formerly, relining necessitated removing the brake shoes, riveting on new linings, and reinstalling them. Now, in most cases, the job can be done with Du Pont explosive rivets without removing the brake shoes from their anchor plates. The saving is about 50 per cent of the former over-all cost of replacing linings.

And explosive rivets outperform conventional rivets set by hand, as proved by dynamometer tests. Also, road tests show that linings fastened the new way are free from objectionable "brake squeal." It means more time on the road and less time in the shop for equipment regularly hauling loads on a 'round-the-clock schedule.

Du Pont 'Alamask' Odorants for the Petroleum Industry

The ability to smell is one of the five senses on which we depend for knowledge of our environment. Because a vast number of things are slightly volatile, they betray their presence and character by odor in the air we breathe. This is particularly true with many products derived from petroleum.

Recently the Du Pont Company, working with petroleum technologists, developed a line of "Alamask" odorants which are finding application by the petroleum industry. These odorants are generally designed to impart a clean odor without resorting to floral, sweet, or fruity perfuming. They serve well in covering the intense odors of some grades of mineral spirits, or the sulfurous odors which may be present in various types of cutting oils. Some grades of spray oils and heater oils, which have objectionable odors are improved by the addition of the proper "Alamask" odorant.

The Du Pont "Alamask" odorants for petroleum products are oil soluble. They possess high odor coverage values. As little as one pound of a selected "Alamask" was reported valuable in reodorizing nine thousand gallons of #2 type fuel oil. In another instance, one pound of "Alamask" gave a neutral odor to seventeen thousand gallons of selected thinner.

"Alamask" odorants are designed by Du Pont's Fine Chemicals Division to give better sales appeal to petroleum products at low cost. The odor of a petroleum product, when pleasant, may prove of considerable sales value.

Du Pont Gives Representatives Thorough Training to Assist Refiners

TAILOR-MADE PROGRAM COVERS MANY MONTHS

How can a Du Pont Field Representative be most helpful to refiners and marketers of petroleum products? That question led to the development of an intensive training program in the Petroleum Chemicals Division.

Trainees receive much valuable instruction in lecture rooms as a supplement to practical experience gained in TEL manufacturing areas, in laboratories and in the field.

As a result, when a Du Pont representative calls at your refinery or marketing office, he is prepared to help you solve many problems concerning TEL and other petroleum additives. His services also include merchandising aids intended to supplement your own marketing program.

To prepare prospective representatives for this important work, each goes through a specialized training program, lasting from 6 months to a year. Each prospect is carefully selected for the job. Almost all hold engineering degrees. Many have had years of actual refinery experience. The training program is adjusted to meet the individual requirements of each man.

First of all, the new prospect goes to work in the main office at Wilmington. As he progresses he studies technical literature . . . familiarizing himself with all phases of the development, manufacturing, safe handling, distribution and application of tetraethyl lead compounds and other additives.

To thoroughly learn the TEL manufacturing process, the trainee spends considerable time in the manufacturing area. Step by step, he studies each phase of manufacturing. He works on quality-control problems, practices safe handling, helps at the furnaces, studies the ethylation process. He even becomes familiar with shipping details.

At-the-plant work in the manufacture of dyes, grease stabilizers and antioxidants is also part of his program. He gets a thorough background on raw materials, processes, and equipment used.

Safety is stressed throughout the training period. Each man becomes qualified to supervise tank entries and tank car unloadings. He also masters the safe technique for handling TEL in drums. So thorough is a Du Pont representative's safety background that he is able to render valuable service to refiners in helping to train their own blending personnel.

To gain a well-rounded working

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED

Thorough Training

knowledge of the Du Pont research activities helpful to refiners, each trainee participates in the work under way at the Petroleum Laboratory. The trainee is also given a brief indoctrination course in refinery processes.

Working with the sales promotion department, the trainee learns how to best apply his knowledge to the varied problems of individual refiners and marketers. How to demonstrate fuel performance with a test car . . . how to make dealer meetings successful . . . these are but a few of the services he learns to perform. Two weeks spent in the New York Office familiarize him with district office operation.

Direct knowledge of the customer's own operations is important, too. Traveling with an experienced representative, the trainee has the opportunity to meet refinery personnel and discuss their work with them.

Through this program, Du Pont is constantly increasing the manpower behind its services . . . making it more valuable to refiners and marketers.

Supervisor of Operations also Directs Instruction of Trainees

In addition to being supervisor of operations for the Petroleum Chemicals Division, B. Gardner Crane directs the trainee instruction program. Gardner Crane came with Du Pont in 1946 after thirteen years with the Ethyl Corporation. With Ethyl's Chicago Division he acted as sales promotion engineer and chief safety engineer. In New York he was in charge of engineering in the safety department. Previous to this, from 1930 to 1933, he was engaged in sales and engineering work for the Acoustical Engineering Corporation in Milwaukee, Wisconsin.

LITERATURE AVAILABLE

The Petroleum Chemicals Division of Du Pont has published a wide variety of material of interest to the petroleum industry. This includes technical papers, bulletins, reports and memoranda as well as equipment operation bulletins, safety regulations, tank cleaning data, marketing aids and the like.

Any of this is available on request to your nearest Du Pont Petroleum Chemicals Division District Office. A partial listing of available material is shown below:

Possible Mechanisms By Which Combustion Chamber Deposits Accumulate And Influence Knock
Serial A-2087a

Tank Talk—A new 52-page booklet designed for easy reading by tank cleaning personnel Serial A-1134

Blending calculator for Du Pont TEL Compound (Aviation Mix)
Serial A-1210

Exhaust Valve Rotation—A resume covering the use of mechanical devices to improve valve life
Serial A-656

The Effect of Hydrocarbon Structure on the Road Antiknock Performance of Motor Fuels Serial A-505

Working with the Petroleum Industry—information about Du Pont's TEL manufacturing and research facilities Serial A-8620

Antiknock Antagonists—by H. K. Livingston, Jackson Laboratory.

New Data on Engine Deposits Presented by Du Pont Engineer

"Possible Mechanisms By Which Combustion Chamber Deposits Accumulate And Influence Knock" is the title of a paper presented at the SAE Summer Meeting at French Lick, Indiana by L. F. Dumont of the Du Pont Petroleum Laboratory.

It is thought that the new data presented by Mr. Dumont on knocking tendency caused by the volume, catalytic and thermal insulating effects of deposits will be of particular interest to refiners.

This figure appears in the paper, "Possible Mechanisms By Which Combustion Chamber Deposits Accumulate And Influence Knock." In the paper it is reproduced as a cross-section, 50 times enlarged, of piston top deposit showing a new technique for examination and evaluation of the effect of combustion chamber deposits on knocking characteristics.

In this connection, on the basis of the research reported in the paper, the increase in compression ratio caused by deposit volume accounts for approximately 20 to 40 per cent of engine octane requirement increase, depending on the engine type and type of deposits. It was also indicated that catalysis may not be a contributing factor, especially for leaded fuel deposits, although considerably more work will be required to confirm these results. The thermal insulating effect of deposits appears to be one of the major causes of deposit knocking harm.

Copies of the paper are available through your nearest Du Pont Petroleum Chemicals Division District Office.

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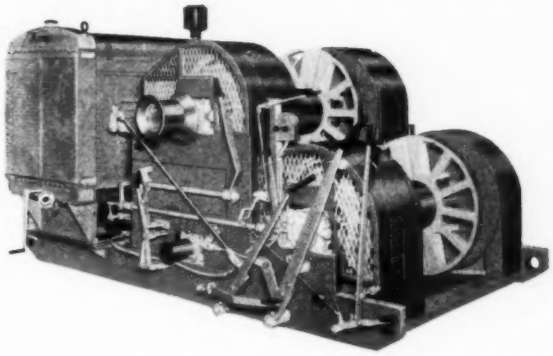
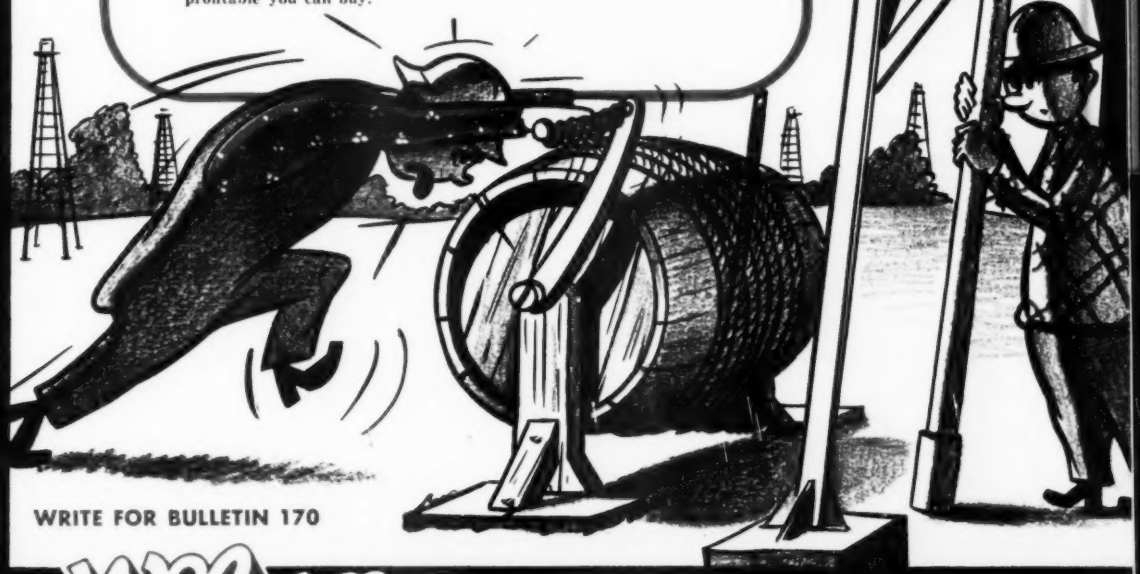


Yes, Sir, right now when well work-overs are important it is essential to have the most efficient winch — one which will do the job faster, without downtime, and make you money! The Wilson SUPER DOUBLE DRUM WINCH is extremely popular where re-spooling counts. Powerful, self-energizing brakes give instant response when needed. Jaw clutches, friction clutches, or the Wilson Air-Tube Disc Clutch, the best anywhere, are optional. Before buying a winch it will pay you to consult your nearest Wilson Representative and let him explain why Wilson Winches are the most profitable you can buy.



WRITE FOR BULLETIN 170

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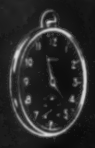
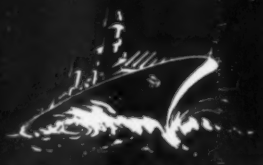
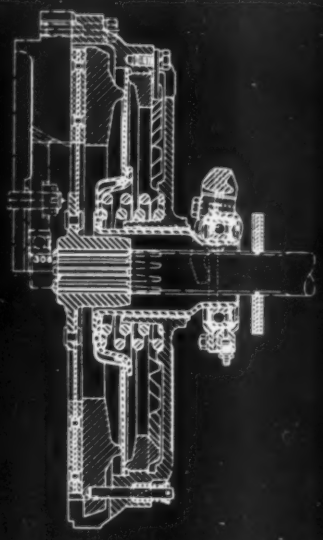
WICHITA FALLS, TEXAS



PRECISION-DESIGNED LIKE A WATCH



PERFORMANCE-BUILT LIKE A BATTLESHIP



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Spicer Brown-Lipe Clutches offer these exclusive service features:

BUILT-IN PARALLELISM assures uniform pressure around entire circumference of pressure plate regardless of wear or adjustment.

ALL PARTS INDIVIDUALLY BALANCED means that replacing a part will not impair balance of assembly.

KNIFE-EDGE DESIGN reduces friction and pedal pressure; provides chatterfree control both forward and reverse.

UNVARYING SPRING LENGTH maintains original pressure regardless of facing wear.

ALLOY PRESSURE PLATE of nickel chromium alloy minimizes destructive warping, heat checking and scoring.

INSTANT ADJUSTMENT for wear is made by turning threaded adjusting ring. No special tools needed.

OTHER FEATURES include prevention of oil leakage; no bearing face wear; low temperature springs; smooth pick-up; single and two-plate models for heavy duty in all transportation services.

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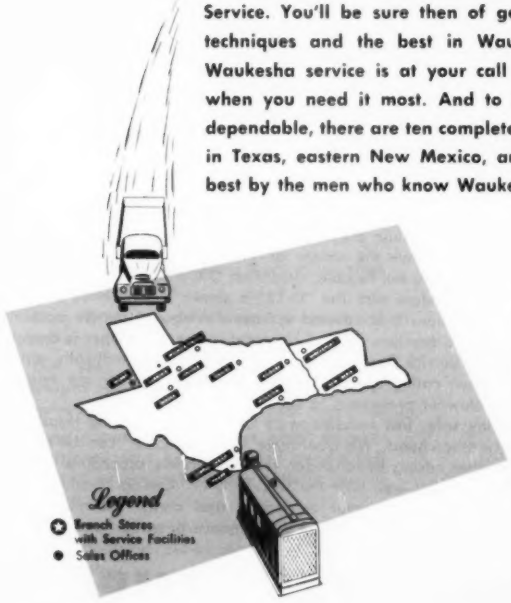

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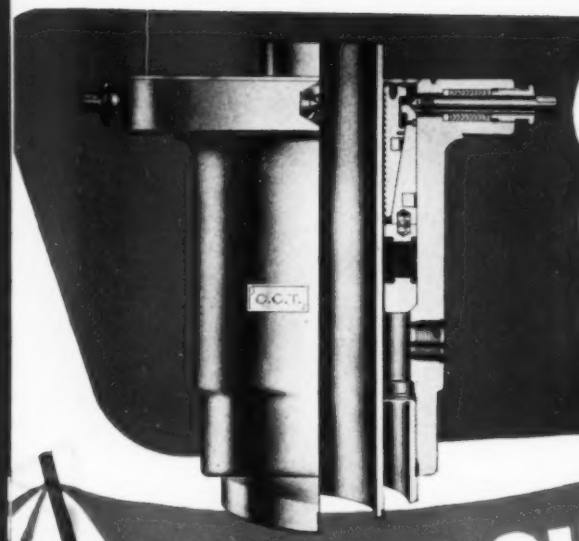

O-C-T "C-19"... and only fully casing hanger

NOW GUARANTEED HOURS OF RIG

BECAUSE IT NIPPLES UP FASTER AND HOLE HAZARDS COMMON TO OTHER

Regardless of how or when you decide to install the O-C-T "C-19" Casing Hanger . . . before cementing, after cementing, through preventers, under preventers, or at any time in case of stuck pipe . . . you can improve the safety of your completion operations and save hours of expensive rig time due to the flexible, simplified O-C-T installation procedure.

The most popular setting procedure with the "C-19" is shown in this series of photographs. The entire series of operations is conducted without leaving any remote possibility open at any time for your well to pressure up and blow out. After the hanger is dropped through the preventers from the derrick floor, a positive seal is made automatically, without a single manual operation, when casing weight is applied. Thus, elevators are released to be used in picking up the blowout preventers to cut off pipe.

Contrast and compare the safe, fast installation of O-C-T "C-19" Casing Heads with the setting procedure of any other head. We guarantee that the "C-19" can be set and nippled up faster than any other casing head under the installation procedure of your choice. Let us show you on your next well how the O-C-T "C-19" Casing Head can save hours of rig time and eliminate hazards to your equipment and crews. Ask your O-C-T Representative today for details of this guaranteed performance or write for the booklet "20,000 Feet and Then Some!"

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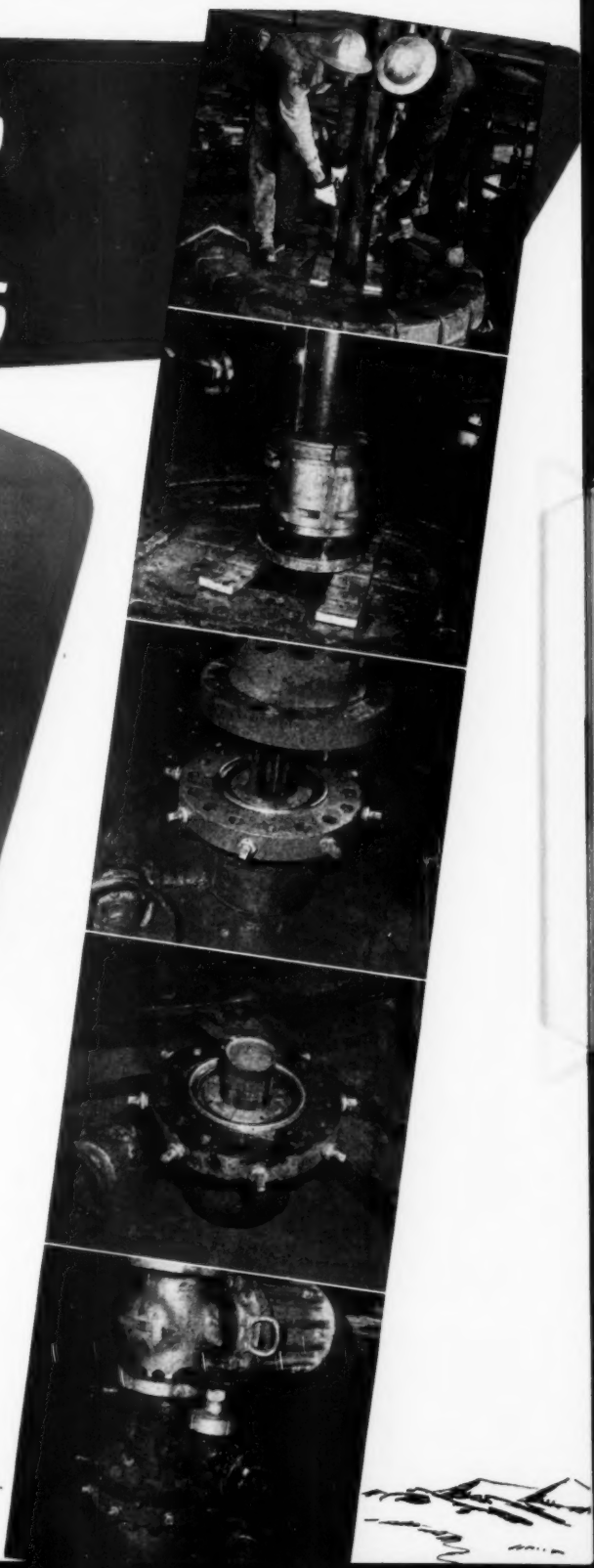
ELIMINATES OPEN CASING HEADS



- Sealing element, slip bowl and slips are factory assembled as a single unit.
- Slips set evenly – heavy keys align slips so tops are level.
- Slips bite evenly – tooth pressure is uniform from top to bottom.
- The seal is automatic when casing weight is applied. No manual work required. Seal requires no field welding.
- Load capacity is twice as great as conventional slip hangers. Will swing full weight of longest strings without mashing pipe.
- Hazardous installation work in muddy and cramped cellar space reduced to minimum.

WOW! A New Record!

We Don't Doubt It, Mister—
WALKER-NEER SPUDDERS are setting
SPEED RECORDS, ECONOMY RECORDS*
All Over North America!

HERE ARE SOME REASONS WHY

- A drastic reduction in maintenance needs is produced by radical improvements in design and by Walker-Neer's powerful, all-ball-and-roller-bearing construction.
- Traveling spudding sheaves and heel sheaves attached to the spudding beams eliminate spooling problems. The long hubs and oil reserve bushings in the sheaves virtually eliminate replacement problems.
- Each drive is operated with an independent clutch actuated by controls located in one operator's position.
- V-Belt drive from engine to clutch-shaft increases power and efficiency under adverse conditions, and V-belt spudding drive assures a quiet, smooth, powerful spudding action without slippage.
- Conveniently located catheads are operated by an independent clutch for starting and stopping at any desired time, adding to the safety of the operator.
- Walker-Neer's improved Double Telescoping Tubular Type Mast assures strength in excess of requirements without braces or struts, and permits easy adjustment of height.
- Mast head sheaves are all roller and ball bearing mounted, insuring free running and eliminating lubrication during the period of drilling a well.
- TOR-SHOCK (Rubber Torsion) Shock Absorber puts extra snap in the tools and completely eliminates all solid jar, prolonging equipment life and assuring a smooth, quiet drilling motion.

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They Say—

Another Gas Grab?

"Last year President Truman vetoed the Kerr natural gas bill, to protect the authority of the Federal Power Commission. Now the commission has voluntarily abdicated the power which the veto protected, and President Truman says he agrees with the abdication.

"So millions of baffled gas consumers may ask the President, as the Post-Dispatch asked the FPC 3 months ago, just what the battle over the Kerr bill was all about?

"The Kerr bill would have prevented the FPC from regulating prices charged by "independent" gas producers—those which do not own pipelines. These prices are reflected in utility rates. Mr. Truman vetoed the gas grab to protect the consumers.

"But then the FPC began to debate whether it had authority to regulate rates of the largest gas producer, Phillips Petroleum Corp. In view of the veto, this was like debating whether grass is green. But eventually the FPC ruled, by 4 to 1, that it lacked such authority.

"Mr. Truman defended this action at a press conference. He claimed to see no connection between the FPC decision and his veto. Perhaps the kindest speculation about his attitude would be that Senator Kerr of Oklahoma, Dixiecrats and other legislators from gas producing states are particularly powerful in Congress now, and the President hopes for their support on foreign policy and other problems."

Editorial in the St. Louis Post-Dispatch.

Importance of Profit

"The men and organizations who search for oil at fantastic depths risk millions in such ventures, and frequently lose them. But they continue even after repeated disappointments because on balance profits can be made if a reasonable proportion of successes is attained. In this activity, as in many others, the role of the profit motive in inducing socially useful action is of primary importance, a fact which our people and our legislators might well keep in mind."

Editorial in the New York Times.

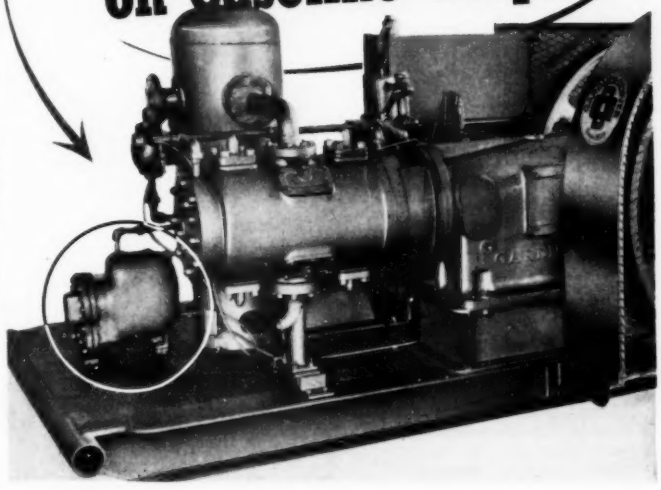
Good Horse Trader?

"You argued in your letter to me that the federal Government leased oil lands too cheaply, and that Texas netted $7,000,000 from its tidelands oil whereas the federal Government would have leased the same submerged oil lands for only $175,000.

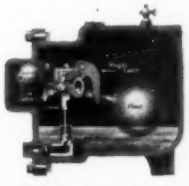
"I should like to point out, however, that the federal Government is

SEND FOR

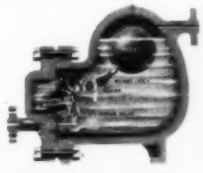
Nicholson Catalog 250 on Gasoline Traps



These Widely Specified Weight-Operated Traps Are Now Serving Many Uses in Natural Gas Industry



Model WO, for press. to 650 lbs.



Model C, for press. to 1500 lbs.

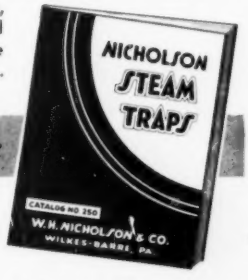
Pictured above, a Nicholson weight-operated trap on a compressor designed for booster, gas lift and repressuring service. It drains gasoline from the scrubber head. Some other common uses of Nicholson gasoline, steam, water traps:

Discharge gasoline and oil from gas well separators, accumulators, after-absorbers, compressor suction lines.

Drain gasoline and moisture forming in low places of field gas lines.

Discharge water collected out of the gas condensate in package and smaller natural gasoline plants.

Also discharge steam condensate from heaters, separators, accumulators and scrubbers in the process stream.



This 32-Page Standard Reference Describes Traps For All Mediums And Pressures

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not obliged to lease tidelands oil under the old Mineral Leasing Act for 50 cents an acre, as witness the secretary of the interior, Oscar Chapman, who leased Barksdale field for nearly $6,000,000—or about $3,000 an acre instead of 50 cents. When you consider that Barksdale field consists of only 2,082 acres on which there was a return of $6,000,000, while Texas leased the huge area of 350,000 acres for $7,000,000, it looks to me as if the federal boys were pretty good horse traders."

Drew Pearson, in an open letter to Texas Attorney General Price Daniel.

No Shortages Here

"There is no reason why any homeowner having an oil burner or expecting to install one should not have adequate supply of fuel oil this winter—nor is there any likelihood of rationing except in event of an all out war. Admittedly, 'spot' shortages may arise in a few areas due to transportation difficulties caused by strikes of transportation employes or severe snow and ice storms. The industry successfully overcame both of these handicaps last winter and is prepared to meet such emergencies if they arise again."

R. H. L. Becker, managing director, Oil-Heat Institute of America.

Don't Boycott Iranian Oil

"The West is no longer as gloomy as it originally was over possible loss of Iranian supplies. It has decided ample stocks of crude oil are available to make up any deficiency, and that reserve refinery capacity can be brought into play.

"If Iranian output falls off, the West will have no choice but to take up the slack elsewhere. The matter of a boycott of all Iranian oil is something else. Who would be served?

"The West surely can use the oil. Reliance on other sources simply cuts down the safe margin of valuable reserves—a critical factor in war. And if we don't take it, the Communist may, even if it requires many years to build the facilities to get it out of Iran.

"What it comes to, in other words, is how far we wish to penalize Iran for what we may regard as unfair, irrational behavior in violation of international law. We must be on guard not to penalize ourselves and the whole cause of freedom."

Editorial in the Midland Reporter-Telegram.

CALENDAR

August

Western Petroleum Refiners Association, regional meeting, Leonard Refineries Auditorium, Alma, Mich., August 17.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

Pacific Coast Gas Association, fifty-eighth

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Whatever your field housing budget — you will find WHITMOR field homes will give you more for your money than any other housing on the market—and you can choose from a variety of floor plans to fit your requirements.

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Whitmor homes are not prefabricated—but are site-fabricated in a special manner by our trained crews. WHITMOR homes cost no more than run-of-the-mill field housing.

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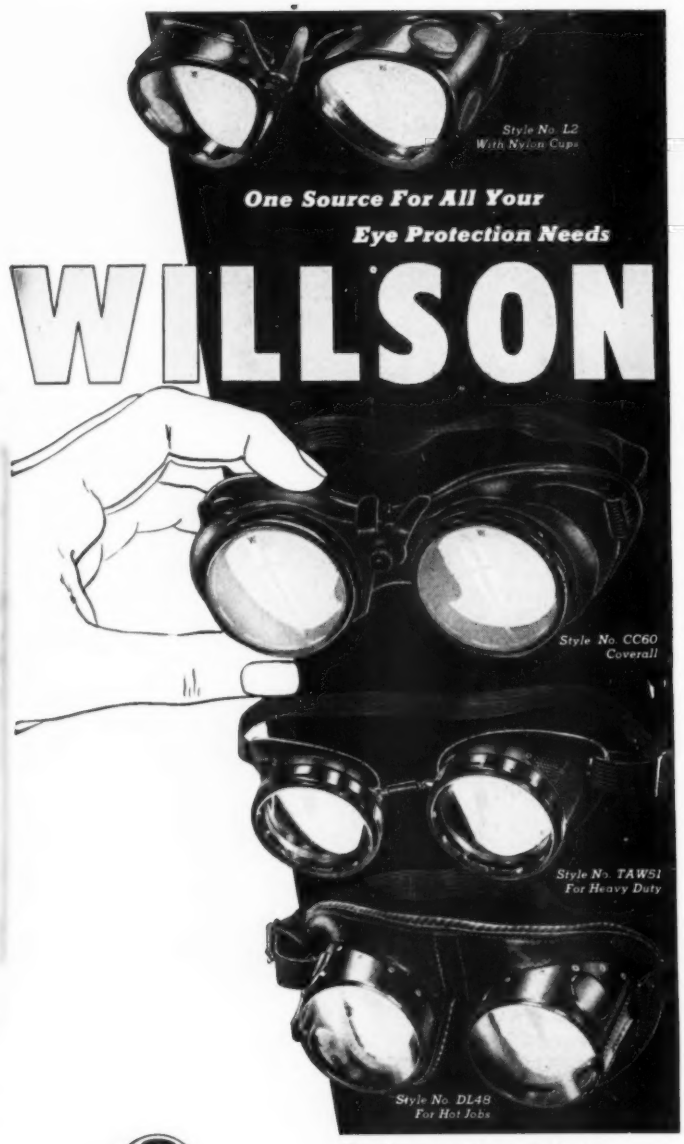

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annual convention, San Francisco, August 21-23.

Eleventh Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va., August 27-29.

September

American Chemical Society, 120th national Diamond Jubilee meeting, Hotel Statler, New York City, September 3-7.

Michigan Petroleum Association, annual fall convention, Ramona Park Hotel, Harbor Springs, Mich., September 6-7.

Billings Geological Society, second annual field conference, Billings, Mont., September 7-9.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

First National Petroleum Convention, Liceo Andres Bello, Caracas, Venezuela, September 9-18.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

Interstate Oil Compact Commission, summer meeting, Fort Worth, September 10-11.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

Air Pollution and Smoke Prevention Association of America, east-central section meeting, Detroit, September 13-14.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Institute of Chemical Engineers, national meeting, Sheraton Hotel, Rochester, N. Y., September 17-19.

Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo., September 20-21.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 24-25.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineering conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engineers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

Texas Independent Producers and Royalty Owners Association, midyear directors' meeting, Tyler, September 28.

October

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

Institute of Gas Technology, annual meeting, Chicago, October 18.

American Chemical Society and Southern Association of Science and Industry, South-

wide Chemical Conference, Wilson Dam, Ala., October 18-20.

National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.

American Association of Petroleum Geologists, regional meeting, Commodore Perry Hotel, Austin, Tex., October 18-20.

Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex., October 19.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers fall general meeting, Hotel Cleveland Cleveland, October 22-26.

Society of Exploration Geophysicists, eastern regional meeting, Webster Hall Hotel, Pittsburgh, October 25.

Society of Automotive Engineers, diesel engine division, Drake Hotel, Chicago, October 29-30.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

November

Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association, twenty-ninth annual meeting, Roosevelt Hotel, New Orleans, November 1-2.

American Association of Petroleum Geologists, Pacific section annual fall meeting, Ambassador Hotel, Los Angeles, November 1-2.

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Southwest Research Institute, second conference on coastal engineering, Rice Hotel, Houston, November 7-10.

Gulf Coast Association of Geological Societies, first annual meeting, Roosevelt Hotel, New Orleans, November 15-17.

Rocky Mountain Oil and Gas Association annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Society of Exploration Geophysicists regional meeting, Baker Hotel, Dallas November 19-20.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

December

American Institute of Chemical Engineers annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex., December 7.

New York Oil Heating Association, Inc. Hotel Statler, New York City, December 10

American Association for the Advancement of Science, annual meeting, Philadelphia, December 27-28.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas - Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: September 11, luncheon, Downtown Athletic Club; September 18, golf party, Knoll Golf Club, Boonton, N. J.; October 1 and October 29, regular meetings, Louis Sherry's; December 8, Christmas dinner dance, Hotel Pierre.

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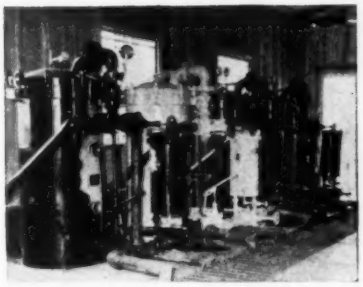

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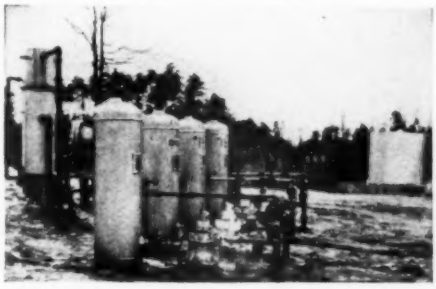

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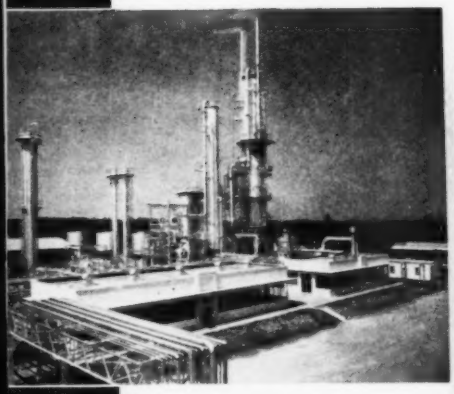

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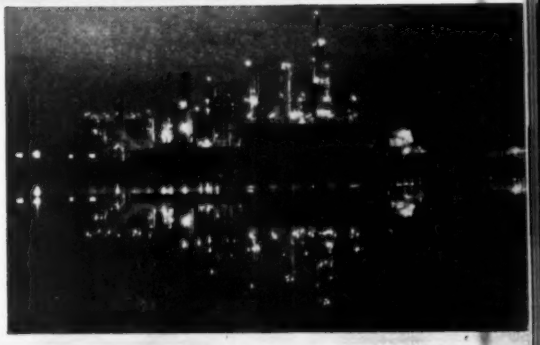

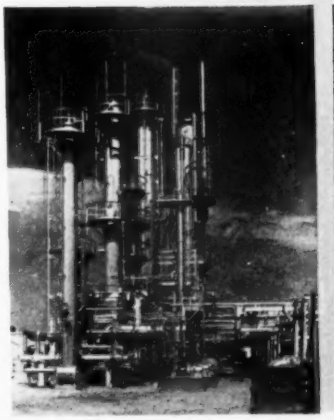

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JOURNALLY Speaking

Antiques Wanted

GOT any old wooden derricks, ox carts, buckboards, or eight-horse teams gathering dust in your attic?

The sponsors of Louisiana's Golden Oil Jubilee, to be held in Jennings September 21-23, are shopping for such antiques. They want to display the sort of tools and equipment used by the oil industry when the first fields were developed in the Pelican state 50 years ago.

As we have noted before, the oil industry moves so fast, then as now, that it never paid much attention to the preservation of relics and landmarks. As new equipment was developed by the ingenious manufacturers it was put into use, and the outmoded was discarded where it happened to fall. Some oil man with time, money, and a collector's instinct ought to make a hobby of rounding up the memorabilia of oil (as some men collect fire engines) and stashing it away out of the rain. Fifty years from now his grandson could make a fortune renting it out to 100th anniversary celebrations.

The Shores of Maracaibo

THE site of one of the earliest uses of petroleum products in the Western Hemisphere will be visited by American oil men attending the Venezuelan National Petroleum Convention in Caracas next month. An airlift is being organized to take official delegates to Lake Maracaibo, where the oil industry started in Venezuela and is still going strong.

In 1499 Spanish explorers sailed into Lake Maracaibo and were struck by two things. The first was the native villages built on stilts over the marshes and low shores fringing the lake. This reminded them of Venice, so they named the region Venezuela, or Little Venice. The second was the accumulation of tar and pitch along the shore, which had floated to the surface from oil seepages below the lake. This they used to calk the seams of their caravels. Many buccaneers who plied the Spanish Main, including Morgan and other pirates, regularly rendezvoused at Maracaibo to calk their ships with its tar.

However, Venezuela was not quite the first site of commercial use of petroleum in the New World, for in 1498 Christopher Columbus discovered the island of Trinidad and its famous asphalt lake, where it was recorded that "he careened his galleons and calked their storm-racked seams with this natural waterproofing material."

The oil seeps in the Lake Maracaibo region were considered a curious phenomenon for generations, but it was not until 1878 that an attempt at commercial development was made, when a small local company dug wells to a depth of 60 ft. and set up a sort of refinery which at times ran as much as 15 bbl. per day, making nothing but kerosine for lighting neighborhood villages.

Shortly before World War I some of the large oil companies became interested in the Maracaibo seeps, and Venezuela's first real oil well was brought in in 1914. From then on exploration was pushed rather vigorously, although the geologists and drillers were sorely tried by the jungles, swamps, insects, and the mysterious Motilone Indians who shot from ambush and picked off a good many of the early-day "petroleros."

Today, as everyone knows, Venezuela ranks next to the United States in oil production, and the progressive cities and modern installations which the convention visitors will see are a far cry from pirates' galleons and thatched villages on stilts.

Old Soldier

OUR man Ted Armstrong, who spent most of last fall and winter in Korea, has been doing some historical research and finds a striking parallel between the see-saw fighting in Korea and the American Civil War.

It seems the Union soldiers captured a town and found some Confederate uniforms hanging in a tailor shop, so they ordered them dyed blue. About the time the job was finished the Confederates recaptured the town and ordered the tailor to fade out the uniforms to their original gray. Fed up with this situation, the tailor refused, and ran off and joined the Army.

Which just goes to prove, Ted says, that old dyers never fade, they just soldier away.

—Henry D. Ralph

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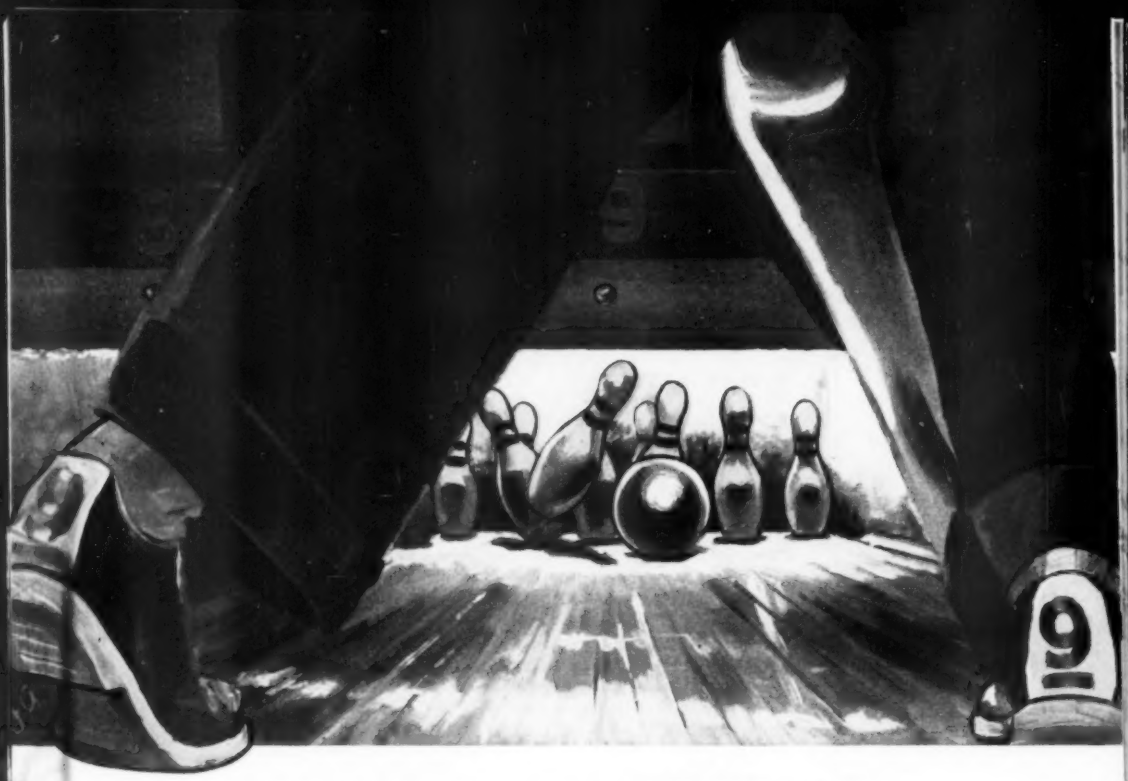

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Common-Carrier Fetish

The Interior Department is embarked on a campaign to make common carriers out of all pipe lines over which it can exert any shadow of jurisdiction. At present this jurisdiction is rather tenuous and rests on its own interpretation of a statute under which it grants right-of-way permits across federal lands.

Interior lost its first round and has been forced by the courts to allow El Paso Natural Gas Co. to complete an interstate transmission line in Arizona. But the decision hinged largely on a technicality, and the main issue of the department's authority was not decided. The department will appeal, and likely will frame a better test case at the first opportunity.

Interior's position is that any pipe line must stand ready to move the oil or gas of any shipper on demand, even if it has to enlarge its facilities to do so. Since it is difficult to lay a pipe line in many parts of the country without crossing some parcel of federal land, Interior stands a chance of forcing many lines, new and old, to conform to its concept of a common carrier.

The common-carrier concept of pipe lines has been a fetish with politicians for many years. Congress long ago made oil lines common carriers by fiat in an action that was ill-considered, arbitrary, and punitive. That legislation was never implemented nor much enforced because it was unrealistic and there was little demand for its application. It is significant that in the Natural Gas Act, which gives the Federal Power Commission authority to regulate gas lines, Congress did not consider it necessary to include a common-carrier requirement.

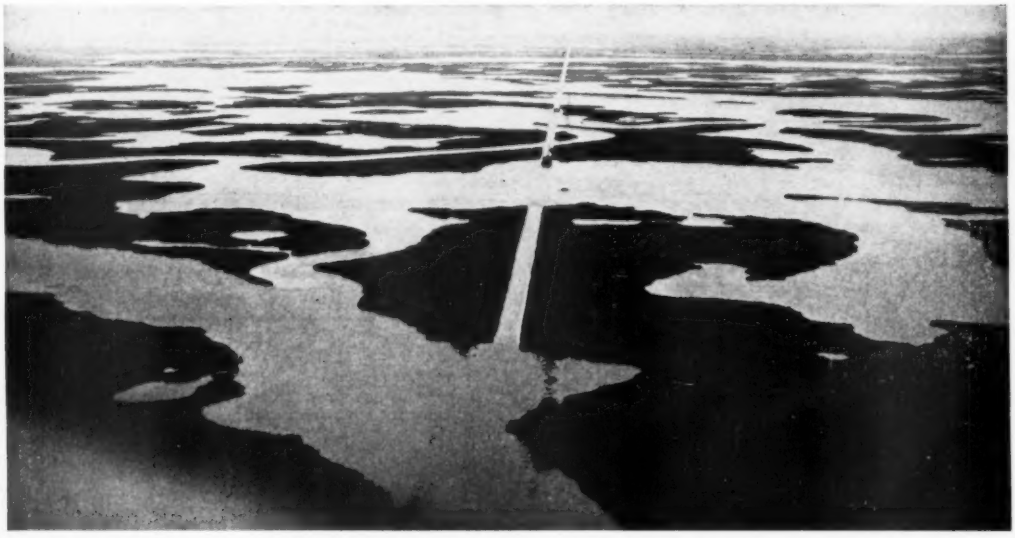
In air, water, and highway transportation, Congress and the regulatory bodies recognize three distinct types of carriers—common, contract, and private. This is admission that the common-carrier concept does not apply, arbitrarily, to every form of transportation. Why the fetish persists in the case of pipe lines is difficult to understand.

Most pipe lines are essentially contract carriers. They are designed and financed to carry no more and no less than the quantities of oil or gas committed to that movement at the time the project was initiated. By their very nature they cannot have the flexibility of capacity which is essential to common-carrier service.

If gas lines are required to give common-carrier service by moving anybody's gas anywhere on demand, their contracts with producers and consumers will be disrupted. The alternatives would be to finance and build additional facilities promptly on demand, or to design lines initially with unused excess capacity just in case some shipper might want to use it later.

The motive of the Interior Department is hard to fathom. Apparently it is straining the language of a minor statute to put into effect a sweeping regulatory principle which Congress did not really intend to legislate, for which there is no general demand, and which would be impractical to apply.

THIS WEEK



NOT A FLOOD.—This picture gives an idea of what is required in the way of ingenuity, equipment, and expense to lay a pipe line across the Mississippi River delta. The aerial view is of operations along the route of the 16-in. natural-gas line being laid by United Gas Pipeline Corp. from Westbay field, near the river's mouth, to an aluminum plant at Chalmette, La. A story on this unusual pipe line *may be found on page 99.*

PRODUCTION—Double-barreled gas lift using parallel strings of tubing devised to produce four dual completions in Hull field 45 miles northeast of Houston. . . . ¶Texas Railroad Commission to grant a discovery allowable to any Spraberry completion 3 miles or more from production in 15 commission-recognized fields. . . . ¶Shell 1 Northern Pacific discovery, now fighting lost circulation, may deepen to Devonian. . . . ¶Shell breaks Louisiana producing-depth record by completing 1 H. T. Gonsoulin in Weeks Island field in 15,296-15,336-ft. zone. . . . ¶Magnolia establishes new tidelands oil pool in its Ship Shoal Block 72 field off Terrebonne Parish, Louisiana. . . .

GOVERNMENT—Supreme Court of North Dakota rules that 2,000,000 acres of school lands in the state may legally be leased. . . . ¶PAD urges immediate intensive effort to expand domestic crude output and refinery operations to offset loss of Iranian oil, says measure taken so far not sufficient. . . . ¶New benzene capacity O.K.'d by DPA totals 81,000,000 gal. a year. . . . ¶DPA certifies four more big oil projects for accelerated-amortization aid. . . . ¶Interstate commerce committee recommends 4-year extension of Interstate Oil Compact to the House. . . . ¶Foreign operators allocated 20,000 tons more steel for fourth quarter by DPA. . . . PAD to provide another 15,000 tons. . . .

TRENDS—Clean product stocks, located east of California, are 36,600,000 bbl. or 22 per cent greater than last year. . . . District 2 stocks are up 34 per cent, accounting for 19,000,000 bbl. of the total increase. . . . Inventories of clean products in District 3 are up only 7.8 per cent. . . .

ACTIVITY—Crude production averaged 6,158,675 bbl. daily for week ended August 11, up 32,475 bbl. daily. . . . ¶A total of 896 wells were completed during the week, an increase of 19 wells over same week last year. . . . ¶Wildcat completions totaled 226 compared with 202 for previous week and 150 for same week in 1950. . . . ¶Rotary rigs operating in United States on August 6 set a new all-time record at 2,662, a gain of 477 rigs over same date last year. . . .

INTERNATIONAL—British seek long-term operating contract for management of Iranian oil industry under nationalization at continuing talks in Teheran. . . . ¶Iraq Government, I.P.C. agree on 50-50 split of oil profits before foreign taxes. . . . ¶Operations of world's second largest refinery at Aruba, N.W.I., cut to 65 per cent of normal when employes fail to show up for work. . . . Labor group demands 20 per cent cost-of-living wage increase. . . . ¶Shell places big still on stream at Stanlow, Cheshire, refinery, tripling plant capacity. . . .

PIPE LINES—Trunkline Gas Co. completes pipe-laying operations 60 days ahead of schedule on 1,775-mile main line from McAllen, Tex., to Tuscola, Ill. . . . Final tie-in made at Obion River in Tennessee. . . . ¶Interstate Oil Pipe Line maps big construction program in Louisiana for 1952. . . . ¶Great Lakes completes Iowa City-Des Moines products line, increases capacity of 12-in. main from Barnsdall, Okla. . . .

REFINING—International Refineries, Inc., will build new $7,000,000 refinery near Duluth, Minn., and Superior, Wis. . . . The new plant, to have a capacity of 11,500 bbl. per day, will adjoin Interprovincial's line running from Edmonton, Alta., to Superior. . . . ¶Ohio Oil to expand capacity of Robinson, Ill., refinery by 33 per cent to 40,000 bbl. per day. . . .

Boost for Synthetics

Interior Department apparently going all-out to set up synthetic-fuels industry with Government footing the bill

Bertram F. Linz

WASHINGTON. — Interior Department plans to use the defense emergency as the springboard for launching a synthetic-liquid-fuels industry are jeopardizing the heretofore friendly relations between the Government and the oil industry.

If recent developments are as reported, Secretary Oscar L. Chapman totally ignored PAD and the National Petroleum Council, the current materials shortage, and the manpower situation in his efforts to aid the construction in Illinois of a coal-hydrogenation plant on which the Government will take all the risks.

Little has been divulged officially so far but the steps to date have been:

A request by Chapman to the Defense Production Administration to provide $400,000,000 from the $2,100,000,000 fund set up in the Defense Production Act to enable government agencies to encourage expansion of production by long-term contracts for the purchase of products which can run to June 30, 1962. At the same time, Chapman asked for $55,000,000 for a small-size shale-oil plant.

Summary removal of James Boyd as head of the Defense Minerals Administration and appointment in his stead of Dr. W. C. Schroeder, formerly director of the synthetic-liquid-fuels division.

Appointment of Schroeder as assistant director of the Bureau of Mines for programs. Schroeder would probably be named director of the bureau in the event of Boyd's resignation.

Look, no risk.—Financial arrangements for the hydrogenation plant reportedly were made by Ferdinand Eberstadt, wartime vice chairman of the War Production Board and now head of a New York investment firm, who worked out a $300,000,000 deal with banks and insurance companies. The plant would be built and operated by Koppers Co., Pittsburgh.

The process which would be employed at the plant has been the subject of experimentation at the Bruceton, Pa., experiment station, and Dr. H. H. Storch, director of the station, is reported to have told the department last month that its efficiency is so doubtful that a commercial plant would be a poor risk for private capital.

Storch also is said to have pointed out that the sponsors of the project refused to take any chances on the process and asked guarantees from the Government for capital, interest, and product disposal at a satisfactory price.

The proposed contract is so drawn that the Government will guarantee the cost of production to the company under various conditions and will take the plant over in the event of failure to operate at its designed capacity.

The reason for Boyd's displacement as head of the DMA has not been officially disclosed, but he is reported to have refused to go along with the synthetics-plant project and to have told Chapman the process selected would not operate successfully with Illinois coal.

Chapman, like his predecessor, J. A. Krug, has been an ardent supporter of a synthetic-liquid-fuels industry and in a number of speeches recently has dwelt upon the necessity for synthetic liquid fuels as insurance against a possible petroleum shortage.

What is involved.—Against the nearly 7,000,000 bbl. of crude oil now being produced daily by the domestic petroleum industry, the proposed 30,000-bbl. coal hydrogenation plant appears insignificant. But it is less insignificant when measured against the materials and manpower supply.

Such a plant, according to a Bureau of Mines report in 1949, would take something over 175,000 tons of steel—more than twice the amount allocated for the refining industry for the current quarter—with additional steel and other materials for the mining of the coal. It would require labor not only for operation of the plant itself, but for the mining and transportation of the coal used as raw material.

Just where the steel would be secured has not yet developed. It might be taken from the allocations for the oil industry, sharply curtailing its operations, and could thereby precipitate the very crisis which the synthetic program is designed to prevent.

The losses to the Government in purchasing synthetic fuel instead of petroleum cannot readily be calculated, but industry circles believe it would be high. The bureau last year claimed that the cost of synthetic gasoline had been brought down to a point where it could easily become competitive, but the industry challenged the claim and a National Petroleum Council study not yet completed is expected to show there is a differential of at least 50 per cent in favor of petroleum.

The bureau's synthetic-liquid-fuels research was authorized by Congress in 1944, with an initial cost estimate of $30,000,000, which since has been doubled. By 1948, the department was pressing for the immediate construction of commercial plants.

What it would cost.—Appearing before the House Public Lands Committee on February 9, 1948, Secretary J. A. Krug declared "the immediate need for supplemental sources of oil and gasoline never was more apparent."

One year later, February 2, 1949, Krug repeated his arguments in his annual report.

Krug estimated that the synthetics industry could be started at a cost of $9,000,000,000 and 16,000,000 tons of steel to produce 2,000,000 bbl. of products daily. Since 1948, however, costs have skyrocketed all along the line and the financial outlay required would undoubtedly be at least $15,000,000,000 today. Reports on the Eberstadt proposal indicated cost of $10,000 per bbl., but it is not known whether complementary facilities are also covered.

Government assistance for the building of new plants is provided in the Defense Production Act. While Congress refused to give President Truman the authority he requested to build government plants and facilities, it did set up the machinery whereby the Government could make long-term contracts for the purchase of any materials needed, thereby in effect guaranteeing a profit to promoters of new facilities for which there might be little outlet under peacetime competitive conditions.

These provisions were really aimed mainly at increasing production of purely military items and it is by their use that PAD, for instance, hopes to secure increased production of alkylate for aviation gasoline.

Timing questioned. — PAD officials, who were charged with responsibility for synthetic liquid fuels in Chapman's order outlining the duties of the agency, refused to comment on the project.

As far back as January 1948, however, Deputy Administrator Bruce K. Brown told a congressional committee he felt it was wasteful to use 4½ tons of coal to produce 3 tons of liquid fuel to be burnt in locomotives or utility plants which could use the hard fuel, and there is no reason to believe he has changed his position.

Brown's views, and those of his associates who have studied synthetic fuels, are known to have been laid before Chapman verbally at various times in the past. All of these men are understood to feel that any syn-

thetic development should start with oil shale, of which there is a tremendous reserve and which has no other use whatever, although they felt there were gaps in the research which should be filled in before commercial exploitation was undertaken.

In the case of neither coal nor shale, however, is it felt that the present is a desirable time to engage in any big investment of either money or materials, in the case of coal particularly since it can be used as is by plants now using residual fuel oil. And residual, it is pointed out, can be hydrogenated far more easily than coal to produce gasoline and other light products.

Pipe Lines Heckled

WASHINGTON. — Requirements that applicants for rights-of-way for oil and gas pipe lines across public lands and reservations agree to operate as common carriers have been put into the form of regulations by the Interior Department. This is despite the fact that legislation to deprive it of authority to impose such conditions is pending in Congress.

Under the new regulations, applicants must agree not only to carry oil and gas for others, whether or not produced from government lands, but also, if they lack capacity, to expand their facilities to as much as 100 per cent of capacity not originally devoted to common-carrier transportation.

The issue became controversial some months ago when the El Paso line was held up because the company resisted the department's common-carrier demands.

Defense Orders Issued

WASHINGTON.—The following orders have been issued by the National Production Authority:

Amendment to M-74, August 1: Expanding the list of construction items in which the use of copper is restricted.

M-4A, August 3: Replaces M-4, which is revoked, as the basic construction order.

Amendment to CMP Reg. 6, August 3: Requiring authorized construction schedules and allotment of controlled materials for construction.

Direction 1 to CMP Reg. 6, August 3: Establishing the procedure for placing authorized controlled-material and defense-rated orders for construction projects.

Amendment to M-1, August 2: Increasing the percentages of iron and steel products to be reserved for rated orders.

M-78, August 6: Providing for MRO supplies for the mining industry.

Amendment to M-71, August 6: Liberalizing priorities assistance to scientific and technical laboratories.

WATCHING WASHINGTON

Bertram F. Linz

Down to the Marrow

Piece by piece, the National Petroleum Council is making studies of present and future problems in every segment of the oil industry.

Reports to be issued within the next few months, together with those already released, are expected to outline the present status of the industry and its future course on a scale never before attempted.

The council last month came up with estimates on how much oil and natural gas will be available annually from both domestic and foreign non-Communist sources through 1955. That study is being continued and additional information and evidence will be worked up.

NPC soon will report on similar studies of crude-oil requirements, including reserves; on refining facilities; and on oil transportation.

It also is studying substitutes for quebracho; the liquefied-petroleum-gas situation; underground storage of oil; the cost in materials and money of a 1,000,000-bbl. increase in the daily output of products; cans and other consuming equipment; and the present cost of production of synthetic-liquid fuels.

All of these investigations have been requested by the Interior Department. Although the only thing that can be said about prognostications on oil is that anticipations are always exceeded and dire predictions never fulfilled, the council's studies will provide a reference work of inestimable value to the government, the industry and the public.

Price Muddle

Price-stabilization lawyers are running into trouble in their attempts to write regulations making effective the Capehart amendment in the new defense-production act. The amendment permits manufacturers to add to their pre-Korea prices any increases in costs of material, labor, overhead, etc., up to July 26.

The trouble is that Congress spoke of "price" not "prices," and now members of Congress and OPS officials are at odds over what the former meant. Taking the act as written, OPS could require a manufacturer to file a separate application for each item he produces, in order to take advantage of the July 26 cut-off date. Taking it as Congress perhaps intended, one application could cover a producer's entire line.

There has been no concealment of the fact that top OPS officials don't like the Capehart amendment. They could make things tough by applying it literally, thereby costing industry millions of dollars and taking years in the process. On the other hand, they recognize that tremendous confusion would follow such a policy, and the intent of Congress would be thwarted which might not be healthy. They would like to have the matter straightened out, although it may require Congressional action to do so.

To make things tougher for the oil-field-equipment industry, its regulation, CPR 30, gave manufacturers a choice of any one of the four quarters starting in July 1949, and ending in June 1950, as the base period. The new act gives a choice of only one of the first two 1950 quarters.

That's o.k. for the manufacturers who selected one of the 1950 quarters originally, but those who selected either of the last two 1949 quarters will have to compute their prices all over again when they file for increases up to July 26.

A tip from an OPS official: Even though a manufacturer is satisfied with his prices as fixed under the general price-freeze regulation, or any tailored regulation under which he has been operating, the smart thing to do is to apply for the increased ceilings afforded by the Capehart amendment when it becomes possible to do so. Then, if conditions make price changes necessary, no formality or delay will be encountered, if the new prices do not exceed the ceiling.

The Little Guy

The Federal Trade Commission has exploded the belief long held in some government circles that the little man hasn't a chance in the oil industry.

The cold, hard fact, the commission has just reported to Congress, is that small refinery corporations are making a higher rate of profit than the large companies. It wasn't that way before the war.

The FTC study showed that refiners in general had a higher rate of return after taxes in 1950 than in 1949, but nothing like the rate in 1948 and slightly less than the 1947 figure.

Expansion Urged

PAD says domestic industry must speed up production now to fill remaining gap in free world's oil supply

WASHINGTON.—An immediate intensive effort to expand crude output and refinery operations is urged upon the domestic industry by Deputy Petroleum Administrator Bruce K. Brown to offset the results of the loss of Iranian oil.

Brown said more than 30,000,000 bbl. of crude and products have been lost to the world so far by reason of the cessation of operations in Iran, and this loss of about 610,000 bbl. a day will continue for some weeks after the Abadan refinery resumes operations.

Arrangements are now being made by a number of companies to step up crude production in the Middle East and the Caribbean area by about 230,000 bbl. a day. In addition about 200,000 bbl. daily of Middle East crude which normally moves to refineries on the east coast of the United States and Canada will be diverted to European and other Eastern Hemisphere refineries under plans now being made by the Foreign Petroleum Supply Committee under the joint-action agreement approved by the government earlier this month.

Still a deficit.—Brown pointed out, however, that this still leaves a deficit of approximately 230,000 bbl. daily of refined products which can be offset only by the domestic petroleum industry.

Crude diverted from United States and Canadian refineries is now being replaced largely from domestic inventories, which are at relatively high levels, he said, but this is only a temporary expedient. PAD plans to keep the state regulatory bodies advised as to changes in the world-supply situation and, if necessary, will support requests of producers for increases in production allowables.

Foreign companies have made arrangements to buy about 130,000 bbl. daily of refined products in the American market during the current month, and, since domestic stocks of most products are at high levels, exports of this magnitude can be supported for a limited time without adversely affecting the domestic-supply situation, Brown reported.

"To maintain exports at this level for any extended period, however," he added, "would require an increase in both crude-oil production and refinery operations in this country. And to make up the entire deficit of refined products obviously would require still greater increases in production and refining.

"I urge the American petroleum industry, therefore, to take all possible steps to expand output and to readjust operations to take account of the Iranian stoppage. Much has been done already, but more remains to be done if producers and refiners are to play their full part in fueling the free world. Nothing less than extraordinary efforts by these segments of the industry will be required."

Expansion insufficient. — Meanwhile, PAD officials who have been studying projected military and consumer demand have reached the conclusion that the 1,000,000-bbl. increase in refinery capacity now aimed at will fall short of meeting actual needs, possibly by as much as 500,000 bbl. daily.

On the basis of this finding, it is probable the oil agency will call upon the industry to expand its construction effort to reach a new goal and ask the National Production Administration for the materials necessary for the larger program.

Benzene Response

DPA o.k.'s new capacity of 81,000,000 gal. yearly

WASHINGTON. — Twelve applications for accelerated amortization of facilities for benzene production have been recommended by the Petroleum Administration for Defense and certified by the Defense Production Administration.

New benzene production from these plants will total 81,000,000 gal. a year, Chairman Lyndon Johnson of Texas, chairman of the Senate preparedness subcommittee, has been informed by Deputy Petroleum Administrator Bruce K. Brown.

Brown submitted a report to Johnson earlier this month showing that since February 14, when Secretary Chapman reported that five applications had been filed for facilities to produce an additional 35,000,000 to 40,000,000 gal. of benzene a year, an additional 10 certificates had been received. Twelve of the 15 applications have now been granted, it was indicated.

Brown pointed out that the National Production Authority, in February, was requesting PAD to provide for the production of benzene from petroleum at the rate of 100,000,000 gal. per year as soon as possible. This objective has since been raised to 131,000,000 gal. annually.

Since February, Brown said, the production rate has been increased by more than 7,000,000 gal. to something over 17,000,000 gal. a year, largely through the adaptation of available facilities.

At present PAD has before it eight applications for quick amortization of facilities with an annual production rate of 54,000,000 gal. The certification and construction of these facilities, Brown said, would place the oil industry in a position to exceed slightly the 131,000,000-gal. target established by NPA.

Tax Aid Granted

DPA o.k.'s fast writeoffs on four big oil projects

WASHINGTON. — Four multimillion-dollar projects for additional petroleum and allied facilities have been given certificates of accelerated amortization by the Defense Production Administration.

The largest is for a $9,500,000 facility for production of motor gasoline at Long Beach, Calif., by Hancock Oil Co. of California, for which certificates were granted for 75 per cent of $7,800,000, 50 per cent of $1,600,000, and 15 per cent of $100,000.

Next largest was a $8,726,970 program of Ohio Oil Co., not yet completely processed, for which certificates were granted for 75 per cent of $5,661,175 and 55 per cent of $1,563,858 for refining facilities at Robinson, Ill.; 50 per cent of $430,000 of a $450,000 pipe line at Mt. Vernon, Ind., and 50 per cent of $417,500 of $450,000 terminal facilities at Toledo.

DuPont, which is expanding its tetraethyl lead production, was given certificates for 85 per cent of $957,000 and 15 per cent of $94,000 for a plant at Deepwater Point, N. J. Socony-Vacuum Oil Co. received certificates for 75 per cent of $888,800, 65 per cent of $350,800, and 40 per cent of $1,389,580 for a $2,629,180 butane plant at Augusta, Kans.

The DPA also granted a certificate to Western Petroleum & Refining Co. for 50 per cent of $128,000 for storage of gasoline at Boise, Idaho.

A review of DPA records shows that up to July 17 a total of 124 certificates had been issued for expansion of facilities for the production of gasoline, fuel oils, and lubricants. The total proposed investment covered by the applications was $587,238,000, and the tax amortization allowed was $448,498,000, or 76.4 per cent.

Steel Allotments Attacked

WASHINGTON. — Numerous complaints are reaching the Petroleum Administration for Defense from various parts of the country regarding its fourth-quarter allocations of oil-country tubular goods.

The latest complaint, widely publicized in Texas, attacks the allocations as making it impossible for producers to fill contract commitments to drill. Earlier complaints from Cal-

ifornia protested the basis on which allocations were figured.

PAD officials explained that complaints received from individual operators and companies are carefully considered and that in many instances additional material is made available from the reserve stock where 1950 operations or other criteria used in the determination of allocations led to an unfair situation.

It was pointed out, however, that applications for material were almost exactly three times as great as the 450,000 tons available, and it was impossible to use contracts to drill as the basis for granting allocations. While it is believed that, individually, operators could use more steel than was granted them, the industry as a whole does not have sufficient manpower or rigs to use the 1,300,000 tons sought.

Repair Rules Issued

WASHINGTON.—Rules under which repairmen serving the oil and gas industry can get materials under the Controlled Materials Plan were spelled out this week by Deputy Administrator Bruce K. Brown of the Petroleum Administration for Defense.

Under CMP Regulation 7, issued last month, a repairman may use the allotment symbol H-9 on his orders to suppliers when buying either materials needed to make repairs or replace what already has been used for repairs. It also applies to materials needed to recondition or rebuild a damaged or used article the repairman intends to sell.

When he uses materials for one of these two purposes, the repairman need not file a copy of his delivery order with PAD.

The allotment Symbol H-9 was established by NPA Order M-46 for priorities assistance for the oil and gas industry. Under that order, repairmen are permitted to have a 60-day supply of controlled materials—steel, aluminum, and copper—and a "practicable minimum-working inventory" of other materials.

PAD Fights for More Plate

WASHINGTON. — PAD officials have served notice on the Defense Production Administration that it is prepared to wage a fight to the finish to secure more plate for the production of pipe and other oil-industry needs next year.

In a letter requesting an additional 25,000 tons of steel for foreign operations during the fourth quarter, PAD said it was not satisfied with the allocations given the domestic industry for that period but would not contest them at this time.

However, DPA was warned, it will be necessary to provide between 200,000 and 300,000 tons more per quarter of plate right through 1952 than was provided for either the third or fourth quarters of this year. The fourth-quarter allocation was 625,000 tons, and PAD made it clear it was prepared to carry its fight for at least 825,000 tons a quarter to the very highest level if necessary.

Officials said the provision of this additional plate might necessitate the conversion of strip mills and the depriving of the automobile industry of metal, but felt that once the duplicated orders now outstanding are cleared away the additional requirements might be available without any severe cuts elsewhere.

Gas Order Studied

PAD restrictions would be subject to state o.k.

WASHINGTON.—A new order restricting the expansion of natural-gas service in 14 eastern states and the District of Columbia is being studied by Petroleum Administration for Defense. If it is issued, however, it will be up to the public-utility commissions of those areas whether to accept federal control or impose their own restrictions.

The order is designed to replace one proposed by PAD last month *(The Oil and Gas Journal, July 12, page 62)* and conforms to the Bow amendment to the defense-production act. That amendment prohibited the issuance of any federal order restricting the use of natural gas in any state whose regulatory agency has similar authority and certifies to the President it has exercised it.

The proposed regulation was discussed last week at a meeting between Charles P. Rather, assistant deputy administrator in charge of gas, and his aides and officials of the areas which are to be covered. Those areas, comprising the District of Columbia and the states of Maryland, Virginia, West Virginia, Delaware, Kentucky, Michigan, Ohio, Wisconsin, Pennsylvania, New York, New Jersey, Massachusetts, New Hampshire, and Rhode Island, are in danger of gas shortages which might cripple defense production in the event of extreme weather conditions next winter.

Shortage danger. — Rather told the state officials of the situation which occurred last winter when steel mills in some sections had to shut down because of gas curtailments and cited one extreme instance, in Pennsylvania where thousands of home consumers had gas cut off and a much larger number had service curtailed.

Recurrence of such situations must be avoided, the state officials were warned, and service expansions must be checked until transportation facilities can be greatly enlarged. There is no shortage of natural gas, Rather assured them.

The limitation order would not affect the use of natural gas by consumers now having service, nor would it preclude some expansion of service in areas where the situation may be eased.

Following the conference, officials of several states said they would study the order and decide whether to accept it or adopt restrictions of their own, as permitted by the law.

Reserve Steel Allocated

WASHINGTON.—The Defense Production Administration has dug into its reserve of steel to provide an additional 20,000 tons for foreign operations in the fourth quarter, and the Petroleum Administration for Defense will provide another 15,000 tons to bring the total for those operations to around 145,000 tons. The original claim filed by PAD was for 183,000 tons, but DPA originally allowed only a little over 109,000.

None of the steel involved in the new allocations is oil-country tubular goods.

Convinced that foreign operations would be seriously handicapped by the small allocation granted, PAD asked DPA for an additional 25,000 tons and promised to throw 15,000 tons from domestic allocations into the kitty. The request received the unanimous approval of the requirements committee, on which the Economic Cooperation Administration, Office of International Trade, and other agencies concerned with foreign affairs are represented.

PAD officials believe that foreign operations will be fairly adequately protected by the 35,000 tons additional which will be available for the fourth quarter.

The support given by the requirements committee and the acceptance of its recommendation that PAD be given an additional allotment is seen as meaning that PAD is now accepted as the principal spokesman on international oil matters, rather than ECA or OIT which in the past have been considered most influential.

I.O.C.C. Extension Endorsed

WASHINGTON. — A 4-year extension of the Interstate Oil Compact was recommended to the House this week by the Interstate Commerce Committee. The extension would carry the agreement to September 1, 1955.

The committee rejected an amendment offered by Rep. John W. Heselton of Massachusetts which would require the attorney general to make a continuing study of action by the compact to insure that its purposes are adherred to, reporting to Congress at least once a year.

Heselton announced he will make

an effort to have his amendment adopted when the measure comes up on the floor of the House. The purpose of the amendment is to insure that neither the states nor the companies operating under the contract violate antitrust laws by using the conservation program to maintain prices.

Transport System Surveyed

WASHINGTON.—Interior Secretary Oscar Chapman has announced that the first all-inclusive survey of the nation's petroleum-transportation system is nearing completion.

The study, being made by eight special consultants for the Petroleum Administration for Defense, will cover existing facilities for moving petroleum and its products by pipe line, tanker, barge, tank car, and tank trucks. It will project expected mobilization requirements through 1952, and give indication of the approximate amount of oil to be moved through 1955.

Chapman said that comparatively complete information exists on refining, production, and demand, but has not previously been available for transportation.

Consultants making the study for PAD are headed by John W. Boatwright, Standard Oil Co. (Ind.). Others are Minor S. Jameson, Jr., of the Independent Petroleum Association of America; Thomas T. Allen, Standard Oil Co. (Ohio); Benedict Saurino, Sun Oil Co.; Paul D. Fell, Sinclair Pipe Line Co.; Frederick S. Lott, Bureau of Mines; Frank S. Perry, Atlantic Refining Co.; Walter A. Powers, Continental Oil Co.; and Donald A. Brew, Standard Oil Co. of California.

GULF COAST

Nautical Pipe Lining

Brown & Root pipe gangs devise new methods to lay big gas line across spongy Mississippi River delta

NEW ORLEANS. — Pipe gangs for Brown & Root, Inc., Houston, are using just about every known method and have improvised a few new ones to lay a 16-in. natural-gas line across the spongy Mississippi River delta near here.

Right-of-way for the 90-mile line, contracted to Brown & Root by United Gas Pipeline Corp., stretches across marshes, open water, mud flats, and in a very few places solid ground. Construction crews in some sections have even had to contend with islands that drift with wind and tide.

The line, when completed, will supply the new Kaiser plant at Chalmette, La., with the huge volumes of gas needed for fuel in processing high-grade bauxite into finished aluminum.

It will transport gas, formerly flared, from Westbay oil field at the mouth of the Mississippi just west of the river's ship-channel entrance. Crossing the river at Venice, La., the right-of-way follows the coast line directly north past Pointe La Hache and Delacroix to Chalmette, frequently in open water.

Installation. — Operations began last fall when Brown & Root started construction of two crossings of the Mississippi while the water was low. The crossings were completed in February, and then the tough job started.

Ordinary line-laying operations are employed in the few places where the terrain is firm enough to support boom tractors. Other sections are too spongy for the tractors but firm enough to permit a lightweight dragline to gouge out a narrow trench for the pipe. Here, the work barge anchors at one end of the trench and pushes the pipe out from the barge.

Where open water and "floating" islands are encountered, a channel 36 ft. wide is dredged. The end of the pipe is anchored, and as new sections of pipe are welded on, the entire work barge is forced ahead.

Pipe preparation.—Pipe for the line is prepared in two yards on the Harvey Canal near New Orleans. The 40-ft. joints are coated with a ½-in. layer of Somastic material for corrosion protection then encased in a ⅞-in. layer of concrete for extra weight to keep the line from floating when carrying gas. The coating brings the weight of a linear foot of the 16-in. pipe to 152 lb. The treated pipe is then loaded on barges at the yards and towed out to the job.

So far the only work stoppages have been due to low tides when pipe-supply barges were left stranded on mud flats.

The line, being built at extremely high cost, will eliminate an expensive and complex aluminum-shipping problem when completed. It will also save shipping time by cutting off thousands of miles the product must travel.

At present the high-grade bauxite is imported from South and Central American ports to Kaiser's primary-extraction plant at Baton Rouge. For final reduction, it is shipped to the Northwest where there is an abundance of electric power, then to the East Coast to factories using finished aluminum.

The new pipe line, along with Kaiser's new reduction plant at Chalmette, will eliminate the need for the long haul to the Northwest and make possible direct shipments to the East.

Louisiana Record Broken

NEW ORLEANS.—Shell Oil Co. has broken its own producing depth record for the State of Louisiana at a Weeks Island field well in Iberia Parish.

The firm's 1 H. T. Gonsoulin made final completion through perforations at 15,296-15,336 ft. and flowed an initial production of 466 bbl. of 33°-gravity oil daily through 10/64-in. choke. Tubing pressure was 2,650 psi., with casing sealed.

This zone is 188 ft. deeper than the previous record holder, Shell 2 Weeks Gall State, also located in Weeks Island, which was completed as an oiler at 15,138-48 ft. Prior to Shell's new completion, this well also held the record as the world's second deepest producer, coming in second to Standard Oil Co. 5 Mushrush, in Wasco field, Kern County, California, which produces from 15,250-15,530 ft.

The 1 Gonsoulin had indications of being the world's deepest producer when it flowed 188 bbl. of oil daily through perforations at 16,572-16,600 ft. A gas-oil ratio of 15,370 to 1 apparently was the reason for failure to produce the lower zone. Tubing pressure was 4,250 psi. and gravity was 45.5°. The hole is bottomed at 16,649 ft., with 4½-in. liner set on bottom.

New Offshore Pool Found

NEW ORLEANS.—Magnolia Petroleum Co. has established a new oil-producing reservoir in its Ship Shoal Block 72 field, off Terrebonne Parish, Louisiana, approximately 8 miles out in the open waters of the Gulf of Mexico.

The well, B-2 State Lease 768, has been completed for 527 bbl. of 35.2° corrected gravity oil daily through 12/64-in. choke. The well also produced 324,000 cu. ft. of gas daily, and gas-oil ratio was 686 to 1. Tubing pressure was 1,700 psi. This new pay sector was perforated at 9,930-56 ft.

This makes the second new pay for the field in less than a year. In December 1950, Magnolia brought in B-1 State Lease 768 as an oiler to establish a new sand at 10,048-54 ft. and 11,036-42 ft.

The B-2 well was drilled to a total depth of 11,150 ft. After running electric log, the well was plugged back to 10,373 ft. before testing. Operators ran 7-in. casing to 10,438 ft. and 2½-in. tubing to 9,908 ft.

New Gas-Lift Method

Parallel tubing strings used in dual-completion gas-lift installations of Houston independents in Hull field wells

F. Lawrence Resen

HOUSTON.—A double-barreled gas lift will be used to produce oil from four dually completed wells in Hull field, 45 miles northeast of here.

The installations are being made on the Brooks lease by King & Heyne, independent Houston operators. A feature of the installations will be the use of parallel tubing strings.

Gas lifts are used in those wells where the reservoir pressure is not sufficient to force oil to the surface. Pressure-operated valves are mounted in mandrels which provide a support for the valve as well as a flow port through which gas may enter the tubing. A series of these mandrels are made up with the tubing string. Gas injected into the tubing provides, at intervals, the necessary "kick" to shove the oil up the hole.

Dual completion.—In a single completion, the gas lift provides no special problems. However, in dual completions, things become somewhat complicated. The two producing sands must be individually produced, requiring two strings of tubing. With the proper type of crossover mandrels, concentric strings of tubing may be used, and this method has been found satisfactory. However, the concentric installations make it impossible to run tools inside the larger string of tubing.

King & Heyne engineers, together with Camco, Inc., Houston, came up with the idea of parallel strings. Paraffin scrappers, highly important in Hull field, may be run in both strings, and bottom-hole bombs run in this large tubing. With the exception of the supporting clamps, both strings will be completely independent of each other.

In running parallel strings, the well is operated as two separate wells and the strings operate independently. In this manner, the fluid level in one string is independent of the fluid level in the other, and the gas-lift valves will operate according to the fluid level in their particular string and not be mutually dependent.

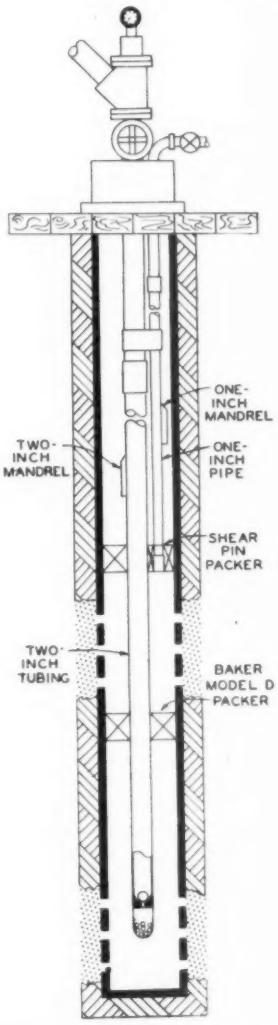
Fluid-operated valves were chosen in preference to gas-operated valves in the interest of conservation of gas and efficiency of operation. Gas-operated valves working intermittently would not be satisfactory with the single compressor serving the four wells.

Installation procedure.—The two pay zones in each well are producing through perforations. A packer was installed between the zones, and through this packer a perforated 2-in. stringer was run and seated. The lower sand produces through this stringer into the 2-in. tubing.

A shear-pin packer with dual flow passage was next inserted above the upper sand to isolate both pay zones from the casing. One of the flow passages connects with tubing running to the stringer on the bottom side and to 2-in. tubing on its top side. The remaining flow passage provides an access through which the upper sand produces. To this flow passage was connected 1-in. pipe.

Just above the upper packer, mandrels were run on both strings of tubing, and then more tubing was run into the well until the position for the next mandrel was reached. This procedure was repeated until 13 mandrels were installed on each string of tubing. Clamps were installed every 180 ft. in order to support the 1-in. pipe. Without these clamps, the pipe would not be strong enough to support its own weight at the 7,000-7,500 ft. depths to which it was run.

GOING IN.—Two mandrels are shown just before the next joint of tubing is run. Just below the 1-in. mandrel may be seen the clamp used to support 1-in. pipe against the tubing string. For illustrative purposes the 1-in. mandrel is shown passing a collar and in a position requiring maximum clearance. In the actual installation, the mandrels are a bit farther apart and are turned inward to make a snug bundle.



HOW IT WORKS.—Diagram showing use of parallel tubing strings in gas-lifting dually completed wells on lease of King & Heyne in Hull field.

Brooks 4.—Production in Hull field is being obtained from the Nos. 1, 2, and 3 Yegua sands. Each of the wells is completed in two of the three sands, which lie between 7,400 and 7,900 ft. deep. Hull field lies over a complex-faulted salt dome, and some of the sands are at an angle of 45°. Field allowable is 100 bbl. per zone per well, giving the four wells a total daily allowable of 800 bbl. Potential on natural flow ranged

from 200-750 bbl. The bottom-hole pressure, which is now at 1,800 psi., dropped 500 psi. in the past 90 days, which led to the installation of the gas-lift systems.

On Brooks 4, the bottom mandrels were run just above the packer at 7,340 ft. and the remaining 12 per string were run at intervals up to 1,000 ft. The total depth of well is 7,840 ft. and the producing zones are Yegua 1 and 3. In completing the well, 5½-in. casing was set through both sands and both zones were perforated at the same time. The No. 4 well is directional, being sidetracked at 4,000 ft. and bottoming up 580 ft. east of location. Maximum angle was 15½°. Clearance between the bundle of 2-in. tubing, 1-in. pipe and mandrels, and the casing is ⅜ in., but the equipment was satisfactorily run even in the directionally drilled Brooks 4.

Compressor. — A compressor station operating on a closed system is being installed to serve the four wells. Gas from the separators will be piped to low-pressure storage consisting of 100 ft. of 26-in. pipe which will contain gas at approximately 40-50 psi. This will be reduced to 22 psi. at compressor intake. A two-stage, 9-in. by 4¾-in. compressor with top pressure of 800 psi. and a maximum capacity of 590 cu. ft. will be used to inject gas into high-pressure storage.

The casing annulus is used for storage of the gas since the fluid-operated valves function according to the amount of fluid which stands above them in tubing and are not affected by the casing pressure to any marked degree. The compressor capacity is greater than needed at the present time, but the extra output may be needed as bottom-hole pressures and fluid levels drop.

Killing wells. — To prevent wells from kicking during installation procedures, a packer was installed, the well was filled with oil, and oil was used to circulate live oil out of the hole. When enough live oil had been removed so that it was possible to pump directly into the formation, 25 bbl. of oil was squeezed into the formation and work proceeded. Whenever the well showed signs of kicking, rams were closed and live oil was circulated out and another 25 bbl. squeezed into the formation. On the No. 2 well, the tubing was taken out without any difficulty, but in going back into the hole it was necessary to stop twice in order to kill the well.

ROCKY MOUNTAIN

Utah Exploration

California companies plan new, big program in state

SALT LAKE CITY.—Plans for continued exploration and development in eastern Utah by The California Co. and of the entry into western Utah by Standard Oil Co. of California were made known here last week by T. S. Petersen, president of California Standard.

The California Co., Petersen said, has budgeted and plans to spend between $5,000,000 and $7,000,000 for drilling activity in the eastern part of the state. Part of this will be for drilling 16 development wells in Red Wash field, of which some are under way and the remainder to be drilled later this year. Balance of the sum will be for exploration in the Uinta basin and in Garfield, San Juan, and Washington counties.

California Standard, which he said would spend around $1,000,000 in exploration in western Utah, previously has not operated farther east than eastern Nevada. Its first wildcat will be the No. 1 Burbank Unit, near Garrison in Millard County. An 8,000-ft. test, it will be located some 60 miles east of Ely, Nev., near where Standard has jointly drilled two tests with Continental Oil Co. and has a third joint wildcat under way.

Petersen further stated that should sufficient crude be developed in Utah, Standard may build a crude or products line from here to either the Puget Sound area or westward through Nevada to the West Coast. In the event a products line is constructed, additional crude stills and catalytic cracking units would be built at its Salt Lake City refinery, he added.

Leases Upheld

North Dakota ruled able to issue school-land oil leases

BISMARCK, N. D.—Legality of oil and gas leases on school lands in this state was upheld by the Supreme Court of North Dakota in a decision handed down here August 9.

Approximately 2,000,000 acres are affected by the decision. The so-called taxpayer's, or friendly suit was brought as a test, and was a nominal suit by the state against Amerada Petroleum Corp., the Board of University and School Lands, and the Attorney General of North Dakota. Amerada has leases on about 60,000 acres of school lands in the state.

Legality of the leases was in doubt under both the Enabling Act, by which North Dakota became a state, and the state constitution.

The Enabling Act granted the state certain lands for school purposes, usually Sections 16 and 36 in each township, provided they were not known to contain minerals at the time of the grant or of the survey. The state constitution provides that school lands may be leased only for grazing, and only at auction, for no more than 5 years, and no more than one section to the same party, but it makes an exception for coal lands.

In 1948 Congress amended the Enabling Act, which also applied to Montana, Wyoming, and South Dakota, by declaring that the presence of oil and gas was not known at the time of the grants so the states have a valid title to these minerals. However, the North Dakota leasing act was passed in 1927, and there was a question as to whether it permitted oil and gas leases. The court resolved this doubt on the basis of a New Mexico decision where the same condition had existed.

The constitutional question was resolved in the decision by reasoning that since the constitution made exception for coal leases it was the intention to confine the restrictions to leases of surface rights only and that the state has power to make different kinds of leases for subsurface minerals.

The decision may also set a precedent for South Dakota, where a similar situation exists. It is believed that all other land-grant states have now clarified their right to grant the usual oil and gas leases on school lands. Earlier this year Arizona got Congress to amend its Enabling Act for this purpose. New Mexico clarified its situation by a test suit in its own courts, and Colorado, Wyoming, Montana, and Washington have had their enabling acts amended by Congress.

Discovery to Be Deepened

BILLINGS, Mont.—Shell Oil Co. 1 Northern Pacific, the Dawson County wildcat that indicated substantial production from Mississippian rocks at 7,183-7,253 ft. a few weeks ago *(The Oil and Gas Journal, July 26)*, is currently fighting lost circulation at a depth of 7,308 ft.

Following the drill-stem test that caused so much interest to be directed toward the western edge of the Williston basin, Shell cored to 7,296 ft. Recovery was 41 ft. of hard, fractured limestone that was stained with oil and carried some free oil in fractures. A drill-stem test of the lowermost section of the hole recovered salt water with some oil.

Now cementing for lost circulation, Shell is unofficially reported preparing to deepen the well to the Devonian. It is believed that the indicated discovery was in the Mississippian-Charles formation. That means that if the well is deepened to the Devonian it has still to cut through the Madison, which has potential oil-bearing strata.

Octane Report

Bureau of Mines survey shows 1950-51 winter ratings even higher than record level reached during preceding summer

O. C. Blade*

MOTOR gasolines sold in the United States during the winter of 1950-51 had slightly higher octane numbers than fuels marketed during the preceding summer when then-record levels were attained.

Average octane values of premium-price gasolines are, on a national basis, 90.3 by the research method and 82.5 by the motor method. Corresponding octane numbers of regular-price gasolines are 83.7 by the research method and 78.8 by the motor method. Increases range from 0.2 to 0.6 of an octane number over the values secured from the summer 1950 survey. However, these increases in octane ratings are less than for any recent survey.

An interesting observation may be made that the winter gasolines have lower contents of tetraethyl lead than the summer gasolines. It is generally agreed that the lighter (lower boiling) components required to "tailor" a motor fuel to winter specifications are in themselves relatively higher in knock value and therefore cause the finished motor fuel to require less TEL. Study of the volatility results of the survey compared with those of several preceding winters indicates a leveling off of the trend toward more volatile motor fuels.

National average values are: Gravity, 62.1° A.P.I. for premium-price and 62.5° A.P.I. for regular-price gasolines; corrosion, negative for all but one of the samples tested; sulfur content, 0.079 per cent for the premium and 0.092 for the regular-price fuels; gum-test results, 2.5 mg. per 100 ml. for premium and 2.0 mg. per 100 ml. for regular-grade gasolines.

Properties of motor fuels sold through service stations in the United States are obtained in accordance with a cooperative agreement between the American Petroleum Institute and the Bureau of Mines of the U. S. Department of the Interior, and this report is a continuation of a series made in cooperation with the Coordinating Fuel Research (C.F.R.) Committee of the Coordinating Research Council (C.R.C.), Inc.

The first of the series of reports presented data on motor gasolines sold during the winter of 1935-36, and succeeding reports described motor gasolines sold during the summers and winters to and including the summer of 1941. No reports were made on motor gasolines sold during the winter of 1941-42 and during the summer of 1942. However, starting with the winter of 1942-43, the semi-annual reports were resumed.

The current report presents analytical data for 4,029 samples, representing the products of 135 companies. Samples represented in this report were obtained during December 1950, and January and February 1951. As in previous surveys, the gasolines covered by this survey include those from both large and small suppliers. The data have been obtained by laboratories of various refiners, motor manufacturers, and chemical companies in cooperation with the A.P.I. and submitted to the Bureau of Mines for compilation.

The arrangement of marketing districts used in the seven preceding reports has been continued. This arrangement of districts was developed by the C.F.R. committee and now comprises 17 districts (as compared with 21 in previous reports) which have been selected with reference to the specifications on motor gasolines, petroleum-refinery locations, population centers, and arteries of commerce such as navigable rivers. One minor change recently has been made—the border between Districts 3 and 8 in Tennessee has been moved eastward to a position near the center of the state.

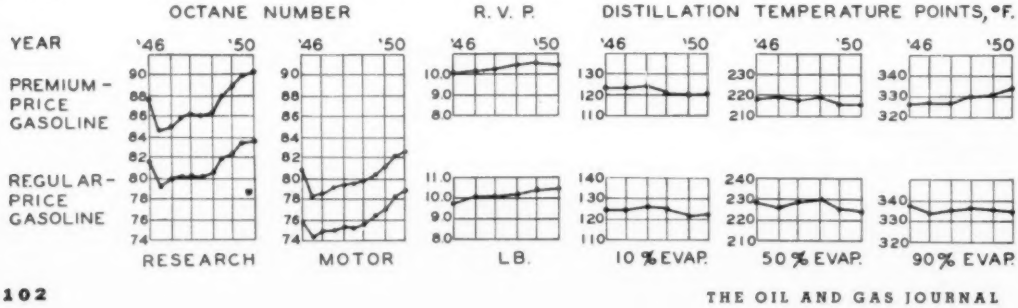
R. I. 4809 includes charts for both winter and summer reasons which show the trends of octane numbers, Reid vapor pressures, and certain distillation points.

*Associate petroleum chemist, U. S. Bureau of Mines. Material from U.S.B.M. Report of Investigations 4809.

SUMMARY OF PRODUCT DATA FOR PAST SIX YEARLY PERIODS

		Octane number				Volatility characteristics, winter surveys			
		Research		Motor			Distillation temperatures, °F.		
	Winter*	Winter	Summer†	Winter	Summer†	R.v.p. (lb.)	10%	50%	90%
Premium-price gasoline	1945-46	87.7	84.7	80.9	78.3	10.0	123	218	326
	1946-47	85.0	85.9	78.5	79.2	10.1	124	220	327
	1947-48	86.2	86.1	79.4	79.5	10.2	124	218	327
	1948-49	86.5	88.0	79.7	80.4	10.4	121	219	330
	1949-50	89.0	90.0	81.2	82.0	10.5	120	216	331
	1950-51	90.3		82.5		10.4	121	216	334
Regular-price gasoline	1945-46	81.7	79.3	75.9	74.4	9.8	125	229	338
	1946-47	80.1	80.2	75.0	75.1	10.1	125	227	334
	1947-48	80.2	80.1	75.3	75.2	10.1	126	229	335
	1948-49	80.5	81.9	75.6	76.4	10.2	125	230	337
	1949-50	82.4	83.5	77.1	78.2	10.4	122	226	336
	1950-51	83.7		78.8		10.5	122	224	335

*The winter survey data as listed are plotted below on the vertical lines separating the year intervals. †Octane values from the succeeding summer surveys follow the respective winter figures and are plotted in the centers of the intervals.



Drake Well Filmed

Same tools used to sink the world's first oiler

TITUSVILLE, Pa.—The Drake well, brought in here 92 years ago as the world's first well actually drilled to find oil, has been redrilled.

Colonel Edwin Drake's old "kicker well," complete even down to the old bullwheel, did the drilling, and a team of horses hauled the crude to a waiting barge on Oil Creek.

The occasion for this reincarnation early this month was the filming of "The Evolution of the Oil Industry," a 30-minute, 16-mm. Bureau of Mines movie made in cooperation with Sinclair Refining Co.

The scenario for the picture is about 32 pages long, 7 of which deal with the Drake well and similar shots around Titusville. The remainder will be made in several other states including Texas, Oklahoma, and Wyoming.

Oil's progress. — The completed picture will show drilling from its earliest days to the latest rotary techniques, and the progression of modern methods of exploration, refining, transportation, and marketing.

This is the fourth picture on the same subject produced by the bureau and sponsored by Sinclair. The others were made in 1920, 1937, and 1945.

Cost of production is borne by Sinclair, but the picture is entirely free of advertising. When an installation belonging to the company is pictured, all company emblems or names on tanks and other facilities are painted over.

The 1945 version, last one filmed, was shown 5,278 times to 339,905 persons. It ranked high in the bureau's list of most popular films.

First showing of the new film is expected to be in about 2½ months. It will be a sound film in full color.

Trunkline Pipe Laying Ends

HOUSTON. — Trunkline Gas Co. completed pipe-laying operations last week 60 days ahead of schedule on its 1,775-mile transmission system from McAllen, Tex., to Tuscola, Ill. The final tie-in was made August 9 at the Obion River in Tennessee.

The Obion hookup was the last of five tie-ins to be completed at skips on the project. Compressor-station construction is expected to continue for several weeks.

Trunkline said construction costs of the big line will be within the allotted budget.

Gas transmission is expected to start in September. Already most of the system is filled with gas. Two-thirds of the line has been internally cleaned and half of it has been tested.

Three crews for pressure testing are now in the field. The 26-in. pipe is tested at 1,000 psi. and 20-in. and smaller diameters at 1,100 psi. High-pressure test gas comes from connections with facilities of other companies.

Industry Briefs

BAYTOWN.—Humble Oil & Refining Co. is currently building a $600,000 addition to its office building located at the site of its 245,000 bbl. refinery here. The addition will consist of two floors with a combined total of 18,000 sq. ft. of floor space plus a basement and will increase the office space about 70 per cent. Completion is expected next March.

HOUSTON.—H. R. Cullen, owner of Quintana Petroleum Corp., has purchased a one-third interest in Liberty Broadcasting System. The radio network consists of 431 stations in 43 states, Hawaii, Alaska, and Japan.

MIDLAND.—Mellon National Bank & Trust Co., Pittsburgh, has bought the interest of G. E. Hall in nine wells in Sweetie Peck pool of Midland County for $1,800,000.

SAN FRANCISCO.—Calvin E. Duncan, investment firm here, has announced that as a result of recent developments, it has abandoned for the present its attempts to effect a merger of Trico Oil & Gas Co. and Southern California Petroleum Corp.

SOUTHWEST

Biggest Spraberry Driller

MIDLAND, Tex.—One of the largest oil-drilling campaigns in the industry is now being carried on in a four-county area of the Spraberry trend in West Texas by Sohio Petroleum Co. The firm now has 46 drilling rigs in operation, and has completed or is in process of completing 21 oil producers.

Sohio's activities are centered in Midland, Glasscock, Upton, and Reagan counties. The Spraberry trend covers portions of at least eight counties, and is 130 miles long, and 50 miles wide.

The company's net crude-oil production and output of other liquid hydrocarbons totaled 5,638,332 bbl. for the first 6 months of 1951, an average of 31,151 bbl daily. This is about 7 per cent above the 29,232 bbl. produced daily during the same period last year.

Standard Oil Co. (Ohio), parent company of Sohio Petroleum, reported that earnings for the first half of the year may not be indicative of results to be expected for the full year.

A. A. Stambaugh, chairman, and C. T. Foster, president, reported that completion of a large number of wells in the Spraberry area by Sohio Petroleum "should not only increase the company's crude-oil production in the later months of the year, but should provide substantial tax credits from intangible development costs."

The company holds leases on about 40,000 acres. The Spraberry activity now covers an estimated 500,000 acres along a trend well over 100 miles long and ranging up to 40 to 50 miles in width.

Sufficient steel casing will be available, the company said, to complete 100 wells this year. "It will take more than 5 years to complete the drilling program which is planned on the basis of results to date.

A detailed article on the geology of the Spraberry area and drilling and completing practices employed begins on page 126 of this issue.

New Spraberry Rule

Wells 3 miles from fields get discovery allowables

AUSTIN.—Texas Railroad Commission will grant a discovery allowable to any Spraberry sand well completed 3 miles or more from production in any of 15 Spraberry fields now recognized by the Commission.

The new policy was adopted upon the recommendation of Jack K. Baumel, chief engineer of the commission's oil and gas division.

To keep the 15-field list from growing, the commission said hereafter such stepouts, instead of taking a new field name, will be carried on the proration schedule in the nearest Spraberry field listed. They will be governed by existing field rules in the field under which they are carried.

In addition to a new discovery allowable for long stepouts, the higher rate will apply to subsequent wells completed within a 1½-mile radius until the sixth well is completed or until 18 months has expired, whichever comes first.

The following fields are those now recognized by the commission as producing from the common Spraberry reservoir. They are:

Aldwell-Spraberry, Reagan County; Benedum-Spraberry, Upton and Reagan counties; Driver-Spraberry, Midland County; Flat Rock-Spraberry, Upton County; Germania-Spraberry, Midland County; Glass-Spraberry, Martin County; Midkiff-Spraberry, Midland County; Pembrook, Upton County.

Pembrook, N.-Spraberry, Upton and Reagan counties; Smith-Spraberry, Dawson County; Snowden-Spraberry, Dawson County; Spraberry Deep-Spraberry, Dawson County; Tex-Harvey, Midland and Glasscock counties; Weddell-Spraberry, Reagan County; Weiner-Floyd-Spraberry, Upton County.

Oil Talks Continue

British seek long-term contract to operate Iran's nationalized oil industry, propose forming new firm

Dahl M. Duff

A LONG-TERM operating contract providing for continued British management of the Iranian oil industry under government nationalization is being proposed by the British delegation now seeking a negotiated settlement of the issue in Teheran.

Richard Stokes, British Lord Privy Seal and head of the delegation, was scheduled to present the plan to the Iranian Government group this week. The British problem was still one of convincing the Iranians that mutual cooperation on the oil problem would be to the advantage of both sides.

Reported plan.—There was no official information on the exact nature of the new proposal. However, it was understood that the plan called for organizing a new company to replace Anglo-Iranian Oil Co., Ltd., the present concession holder. This new company would run the Abadan refinery and possibly also the fields. Distribution and sales would continue under British control, probably through a subsidiary of Anglo-Iranian.

There was little new in the general outline of the British proposal. The British have conceded nationalization of the industry and have been known to favor a long-term operating contract. Stokes said the new proposal made no mention of the division of revenue and that this was a matter of adjustment to be worked out later.

Earlier, the two sides sought agreement on a formula which would allow early resumption of oil operations on an interim basis. At their third meeting, the government groups agreed to the appointment of a subcommittee to study the problem of tanker receipts and attempt to work out a compromise.

Exports out of Iran came to an end June 22 when the British refused to accede to Iranian demands that tanker captains sign receipts acknowledging Iranian ownership of the oil. This was the facet of the main dispute that precipitated the loss of more than 600,000 bbl. daily in crude and products to world supply.

Tanker question.—Indications have been that the British are not anxious to return their tanker fleet to Iran and reactivate the staff for full operation without some long-range solution of the whole situation in prospect. It would take at least a month to resume large-scale production and shipment.

There was little concrete information to indicate the trend in the negotiations. Both sides apparently were proceeding with considerable caution. Although some fervent nationalist leaders continued to rant against the company, the news from Teheran pointed to a somewhat more moderate attitude on the part of responsible Iranian leaders.

Real work of the negotiating conferences apparently was being done in behind-the-scenes meetings of technical experts of both sides. Some sources feel that the developments of the last 2 months have convinced the Iranians the Western World will exist without their oil if necessary and that they do not have the operating experience to run the industry themselves.

Abadan visit.—Before the talks began in Teheran, Stokes and Harriman paid a visit to Abadan to obtain first-hand information on conditions there. About 1,000 of the 2,600-man British staff still remain in Iran, and the restrictions to which they have been subjected by Iranian authorities have hardened the British attitude in the entire controversy.

Anglo-Iranian's British employes still in Iran made clear during Stokes' visit their own views on continuing to work in the country for a fully nationalized oil authority. A British staff consultative committee presented Stokes with a list of grievances and outlined the conditions under which they would stay on the job.

The committee told Stokes they would remain only for an organization predominantly British, one that was technically and administratively efficient, and which would offer security under which they and their families could reside in Iran.

Despite the thus far favorable tone of the negotiations, friction in the relations between the two sides was apparent. The British consul at Abadan, Maj. Francis Capper, was reported to have told newspapermen that the Iranian Government should create a better atmosphere for the negotiations by recalling Hussein Makki of the "take-over" mission, ceasing its interference with the company, and restoring to the British staff their houses, automobiles, and other property. The Iranian Government called on the British for an explanation and was told the consul's remarks were expressions of his own opinions.

At one of the initial meetings in Teheran, a British official explained to the Iranians the nationalization methods used by the British Labor Government itself and the way in which private interests were safeguarded.

After this session, a member of the Iranian delegation said they resented being treated like students. An Iranian senator asserted the discussion was "very interesting but very academic."

Oil replacement.—While the negotiations were taking place in Iran, oil-company officials in London and in New York continued their efforts to fill the gap caused by the loss of Iranian production.

An official connected with this program said that arrangements thus far made will avoid any serious difficulties through August and probably September. Beyond September, the urgent question is of finding and utilizing excess refining capacity.

Crude oil now committed through diversion of Middle East shipments to the United States and Canada and through exchanges and other arrangements appears sufficient to handle the spare refining capacity turned up to date. Later utilization of surplus refining capacity in the United States may call for an increase in Texas crude allowable.

The stop-gap British purchasing program has provided about 310,000 bbl. for August lifting, of which some 225,000 bbl. daily is from the United States. For the fourth quarter, the total bought from American-owned sources amounts to an average of about 130,000 bbl. daily.

This purchasing program is regarded as a temporary measure which cannot be kept up indefinitely on a large scale. Much of it is coming from stocks which will be drawn down by winter consumption in this country.

Iraq, I.P.C. Agree

Government to get 50 per cent share before taxes

THE long-awaited announcement of a 50-50 profits-split agreement between the Iraq Government and Iraq Petroleum Co., Ltd., was made early this week in Baghdad.

The agreement applies to I.P.C. and its two subsidiaries operating in Iraq, Basrah Petroleum Co., Ltd., and Mosul Petroleum Co., Ltd. The 50 per cent government share applies to profits from oil operations within the country and is taken before foreign taxes are deducted.

Iraq will receive its share partly in crude oil and partly by cash paid through taxes. The government can dispose of its part of the crude as it likes and sell any remainder to the

companies at world prices. The agreement is retroactive to January 1, 1951.

By 1955—when the 30 and 31-in. Mediterranean pipe line is completed and the Basrah area is in full production—Iraq production is expected to be 30,000,000 tons a year or about 600,000 bbl. daily. From this Iraq will receive £59,000,000 or the equivalent of $165,200,000.

LATIN AMERICA

Problems in Venezuela

Record output, plus demand for still greater production, raises question of stability of nation's oil-based economy

THE present emergency has lifted Venezuelan oil production to a record level of more than 1,600,000 bbl. daily but it has at the same time raised a number of questions related to the long-range stability of the country's oil economy, according to Walter J. Levy, New York oil adviser.

Among these problems are: the rate of economic and industrial development in Venezuela as compared to the rate of oil withdrawal; Venezuela's worsening terms of trade resulting from price increases of most commodities other than oil; the question of post-emergency outlets for an expanded Venezuelan oil industry; and the necessity for the industry in the country to operate in accordance with sound economic and technical considerations instead of an "on again, off again" basis.

Levy's views are presented in a detailed study, "Venezuelan Oil in the Framework of Western Hemisphere Supplies," which was prepared for the Venezuelan Government at the request of the Banco Central de Venezuela. Levy is an adviser to the Venezuelan Government as well as various companies and other organizations, among them the State Department and the President's Materials Policy Commission. He is now assisting in the negotiations to settle the Iranian oil nationalization issue.

The Venezuelan study consists of a series of five monographs devoted to economic phases of Venezuelan oil. It is backed up by numerous statistics showing the importance of Venezuela's petroleum industry, its accessibility, its capacity for rapid expansion, and the significance of its production of heavy crude.

Supply.—Levy noted that as of August 1, 1950, productive potential in Venezuela was about 1,600,000 bbl. daily. Estimates made of the possibility of expanding production by about 25 per cent showed this increase would involve using some 500,000 metric tons of material, such as steel and cement. This 2,000,000-bbl. daily production could be achieved in Venezuela in about 2 years, or even somewhat less by an extra effort. A production of 2,000,000 bbl. daily, he commented, exceeds the highest rate of military consumption by all Allied nations during World War II.

This and other data give assurance of a future supply of Venezuelan oil, but the maintenance and expansion of the industry is predicated on the availability not only of the necessary steel and other scarce materials required by the industry but also necessary imports needed by other sectors of the country's economy.

Price. — Price trends, Levy pointed out, have been unfavorable for Venezuela. Oil provides more than 60 per cent of total government revenue and contributes more than 95 per cent of the foreign exchange needed to implement the country's economic development program and provide essential requirements of the country. The United States is the source of same 74 per cent of total Venezuelan imports.

Changing terms of trade, however, pose a problem for the Venezuelan economy, Levy reported. Wholesale price indexes in the United States show that in 1949 oil was only about 12 per cent above the 1926 price level, whereas the prices of such large import items in Venezuela as textiles and farm products had risen to 40 and 65 per cent, respectively, above the 1926 level.

"Since May 1950, wholesale prices in the United States showed a further considerable rise . . ." he said. "On the other hand, the price of Venezuelan oil, related to the prices of Texas crude oil and Bunker C fuel oil, rose only by an average of about 2 per cent above the May 1950 level. United States price controls have now frozen prices at or near these levels, resulting in a deterioration of the terms of trade for Venezuela in 1950."

The availability of ample oil supplies in emergencies is predicated on a prosperous industry in Venezuela and on the preservation and development of sound trading relationships essential for the Venezuelan economy. Levy added that the question of post-emergency outlets for an expanded oil industry in Venezuela may, under certain circumstances, be a serious one.

One particular aspect of this concerns heavy fuel oil. In times of emergency, requirements for this product increase considerably above normal demand because large quantities of this fuel are needed for defense uses. Venezuela is the largest producer of heavy crude oil in the Western Hemisphere, larger even than the United States, and the importance of this type of crude in an emergency is shown by the fact that the industry trend toward lower residual fuel-oil yields was reversed during the last war.

Production factors.—In his review of the oil industry in Venezuela, Levy listed several factors which have enabled Venezuelan oil to contribute an increasing proportion to rapidly growing world petroleum demand.

With the exception of the war period, average production per well in Venezuela has ranged from 210 to 225 bbl. daily, compared to an average per well production of between 11 and 13 bbl. daily in the United States in the postwar period.

The percentage of dry holes to total wells drilled in Venezuela amounts to some 10 to 12 per cent in the prewar and postwar periods. In the United States, the dry-hole percentage increased from 23 per cent in 1939 to 28 per cent in 1946 and 33 per cent in 1949.

Annual crude production per foot drilled is much higher in Venezuela —about 8 to 10 times as large. For example, in 1949 crude production in Venezuela was equivalent to 135 bbl. per foot drilled during the year while the corresponding figure in the United States in the same year was 13 bbl.

Reserves.—Levy reported that recent estimates now place Venezuelan reserves at close to 10 billion barrels. If reserves are considered as 9 billion barrels as of the end of 1950, the increase over 1938 amounts to about 260 per cent.

Venezuela's share in total Western Hemisphere oil reserves rose from 12 per cent in 1938 to 24 per cent in 1950. Venezuela's production - to - reserves ratio rose from 13.3 in 1938 to 16.5 in 1950, while the ratio in the United States decreased from 13.7 in 1938 (including condensate) to 12.8 in 1950 (excluding condensate).

Distribution.—Discussing the flow of Venezulan oil, Levy noted that only a small percentage of the country's large production is needed to satisfy its domestic requirements and that it is the only Western Hemisphere source to meet growing demands of this part of the world. The most significant change in the flow of Venezuelan oil has been the fundamental shift to Western Hemisphere destinations.

While in 1938, about 43 per cent of Venezuelan oil was sold in the Western Hemisphere, in 1950 nearly three-fourths of total exports of Venezuelan oil was used to help satisfy the de-

mand of the Western Hemisphere nations. Exports to South American destinations increased almost four-fold, from 50,000 bbl. daily in 1938, to 190,000 bbl. daily in 1950. This represented about 10 per cent of total shipments of Venezuelan oil in 1938 as compared to 15 per cent in 1950.

The United States, as a result of changes in its supply-demand pattern, has become the world's largest net importer of oil, Levy said, and it is by far the most important single market for Venezuelan oil. Exports of Venezuelan oil to the United States consist of about equal parts of crude oil and residual fuel. The next biggest market for Venezuelan oil in the Western Hemisphere is Canada with 99,000 bbl. daily, followed by Brazil with 72,000 bbl. daily, and Argentina with 61,000 bbl. daily.

The tie between the United States and Venezuela is further apparent in the size of the American oil investment in the country. In 1945, Levy reported, United States private investments in Venezuela stood at $445,000,000, or 5 per cent of total foreign investments of United States capital. In the postwar period, nearly one-third of the new United States foreign investments flowed to Venezuela, raising the total United States investments in the country to well over 1.2 billion dollars out of a total foreign invetment of nearly 12.2 billion dollars. Most of this is invested in the oil industry, and more recent estimates indicate that of the total of 1.9 billion dollars invested in the Venezuelan oil industry of as early 1951, about 1.4 billion represented investments of United States capital.

CIMA Spuds New Wildcat

Another wildcat test has been commenced by Mexican American Independent Oil Co. on the Tecominoacan structure in the Isthmus of Tehuantepec region south and east of Rabon Grande where the company brought in a 225-bbl. producer last June.

With seismograph work indicating the existence of a large structure extending northward from the well location, CIMA officials believe that the Tecominoacan area holds considerable promise. Tropical rains delayed clearing the location, but it is anticipated the test now started may be completed in about a month.

At Rabon Grande, CIMA has spudded in its second well and a third location is awaiting the arrival of a rig to be loaned by Petroleos Mexicanos. Rabon Grande is a tidelands location, while Tecominoacan is an uplands area.

The original Pemex-CIMA agreement designated three tidelands and four upland structures for testing under the percentage-of-production contract.

Aruba Cutback

Labor trouble slows output of second-largest refinery

THE world's second largest refinery at Aruba in the Netherlands West Indies was cut back to 65 per cent of capacity early this week as a result of labor trouble.

The Aruba refinery of Lago Oil & Transport Co., Ltd., was being kept in partial operation by some nonstriking workers and members of the foreign staff. The plant has a capacity of 450,000 bbl. daily and has been running well in excess of this figure. Lago is an affiliate of Standard Oil Co. (N. J.).

The partial loss of the Aruba capacity, and the fear that throughput may be curtailed further, was particularly serious in view of shutdown of the Abadan, Iran, refinery. British-American industry groups have been striving to offset the Iranian loss, and a prolonged stoppage at Aruba would be chaotic to world supply.

The 3,500 Aruba refinery employes were offered first a 9 per cent cost-of-living increase. This was later raised to 16 per cent, but the workers demanded a 20 per cent boost. Negotiations were continuing. A company of Dutch marines were sent to the plant to prevent any disorders but were later withdrawn.

It was reported that many of the employes appeared at the area early this week but did not enter the plant. A local magistrate was appointed to mediate the dispute.

EUROPE

Refinery Spurt

Relaxed controls expected to enable West Germany to almost double annual output during next 2 years

THE West Germany refining industry, which was running at a rate of 4,238,000 tons annually, during the first quarter of this year, is expected to expand to a total annual capacity of slightly more than 7,540,000 tons during the next 2 years.

The 7,540,000-ton projected capacity is approximately equivalent to 150,000 bbl. daily. The oil committee of the Organization of European Economic Recovery in Paris has accepted a revised list of building and expansion projects calling for a total throughput of 6,340,000 tons for the fiscal year 1952-53.

In that year, two other projects for an aggregate of 1,200,000 tons are to be added. These are the refinery of Gewerkschaft Erdoel-Raffinerie Emsland in Lingen, capacity 500.000 tons, and the enlarged Esso refinery in Hamburg with a capacity of 700,000 tons a year.

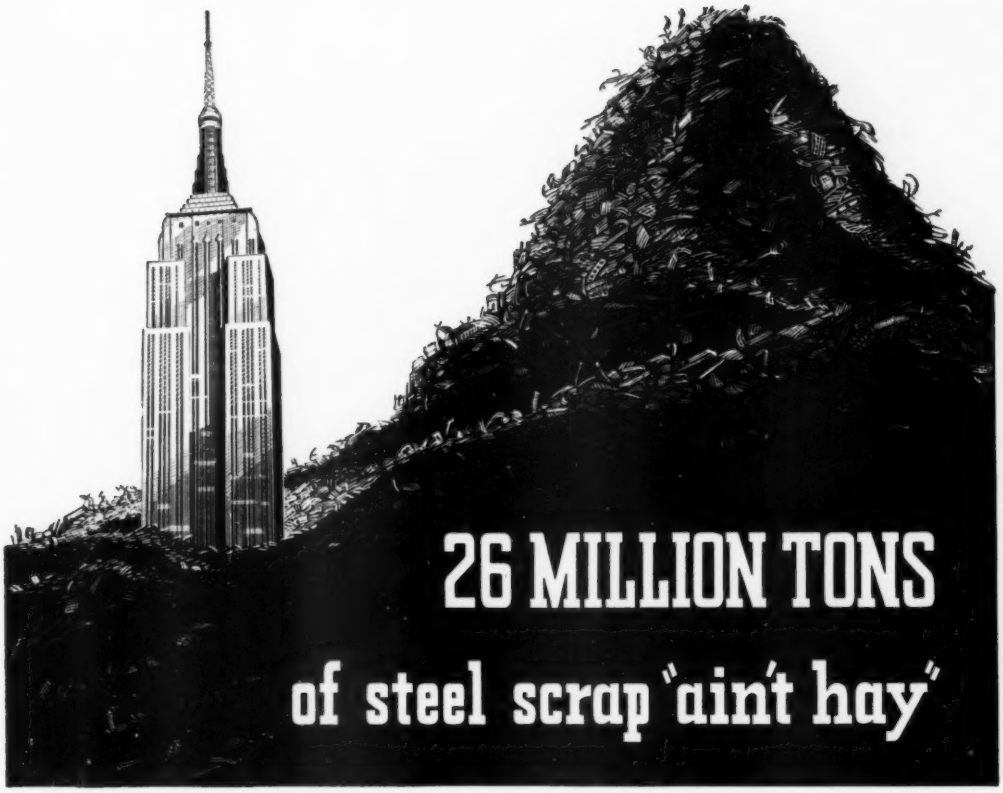
Emphasis on crackers.—Cracking plants comprise a substantial part of the new building plans. In the fiscal year 1952-53, the republic is expected to have thermal cracking plants with an annual throughput capacity of 970,000 tons of topped crude, catalytic cracking of 1,400,000 tons throughput, the hydrogenation capacity of 760,000 tons of residues annually. Cracking capacity is of especial importance in Germany where consumption heavily favors the lighter products because of the wide use of coal instead of fuel oil.

The German oil industry is to be enlarged to an extent that the approved consumption of motor fuels as well as other products, lubricants, fuel oil, asphalt, etc., can be covered from domestic refinery production, based on both German and foreign crude. Any surplus which would have to be exported is to be avoided. The O.E.E.C. has warned the West German Government and the industry to prevent any refinery building not authorized by the joint European organization.

Because of the increase in industrial production in West Germany and the rise in newly licensed trucks, consumption figures for motor fuels as fixed by the O.E.E.C. committee have been considerably increased over previous calculations. For 1951-52, gasoline requirements were placed at 1,900,000 tons, and diesel, at 1,575,000 tons. For the following fiscal year, gasoline requirements were set at 2,100,000 tons, and diesel, 1,725,000 tons.

Controls relaxed.—Some of the German refining capacity is in the two former hydrogenation plants which have been processing crude oil. In the recent removal of controls from German industry and shipbuilding by Allied authorities, the prohibition against the production of gasoline from coal by hydrogenation or Fischer-Tropsch synthesis was dropped.

While the action was welcomed in West Germany, it was emphasized that it would be uneconomic or impossible for the German industry to resume motor-fuel production in these plants on a large scale as during the war. There are four hydrogenation plants and six Fischer-Tropsch plants in Western Germany. Some of these are already in operation, though not



26 MILLION TONS of steel scrap "ain't hay"

IT took 57,000 tons of steel to build the Empire State Building in New York. That's about one-tenth of one percent of the tonnage of scrap required to produce the new steel demanded for America's defense and civilian needs this year.

Half of this scrap is produced by the steel mills themselves. The other half - approximately 26 million tons - must be supplied by the public. That tremendous tonnage is the equivalent of 461 Empire State Buildings - over 1400 carloads of scrap every day of the year.

Right now there is a scrap shortage. It threatens to interfere with steel production. So we appeal to you, as a user of steel and steel products, to do all you can personally to help collect scrap.

Somewhere in your place of business - and even at home - there are things that can be scrapped - worn-out or obsolete machines, pipe, boilers, tools, structural parts, etc., that you'll never use again in their present form. Turn them in through regular channels. Call the nearest dealer and start your scrap on its way to the steel mills - to help America reach its production goal of 105 million tons of new steel in 1951. It is this team-work that will help us win the victory again.

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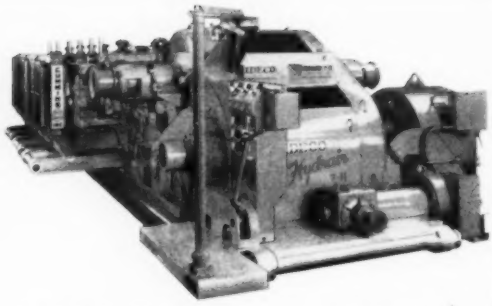
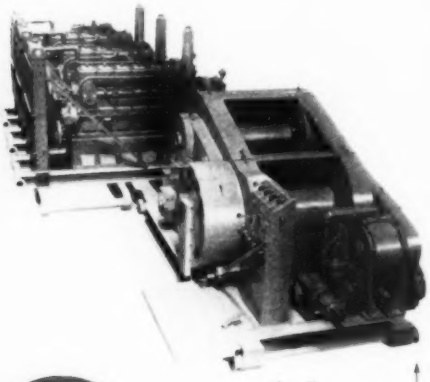


The *Hydrair* 7-11 . . . a torque converter equipped rig recommended for drilling to depths of 10,500 ft. with $4\frac{1}{2}$" drill pipe when powered by engines developing a total of 1050 H.P.

IDECO Hydrair RIGS

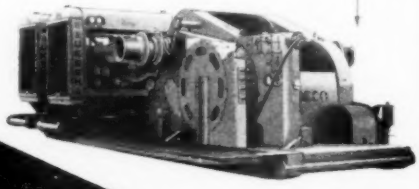
All Hydrair Rigs are available in single and double drum models.



NEW Available in torque converter and mechanical models H and M 750 series drilling rigs are recommended for drilling to 8,000 ft. with $4\frac{1}{2}$" drill pipe when powered with two or three engines developing a total of 700 to 750 H.P.

The *Hydrair* H-525 . . . a torque converter equipped rig recommended for drilling to depths of 7,000 ft. with $4\frac{1}{2}$" drill pipe when powered by two or three engines having a combined output of 500 to 600 H.P.

The *Hydrair* H-40 . . . a torque converter equipped rig recommended for drilling to depths of 6,500 ft. with $4\frac{1}{2}$" drill pipe when powered with one or two engines developing a total of 400 H.P.



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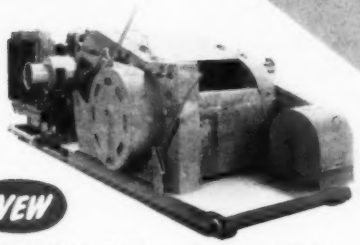


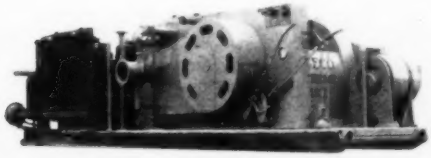
NEW

The *Hydrair* H-35 . . . a torque converter equipped rig for drilling to 5,000 ft. with 4½" drill pipe when powered by an engine developing a total of 350 H.P.

The H-35 is available in three models. H-35-S . . . a single drum drilling unit for wire line servicing to 13,500 ft. H-35-D . . . a double drum drilling unit for wire line servicing to a depth of 11,500 ft. H-35-DD . . . a double drum drilling unit for wire line servicing to a depth of 16,150 ft.

The *Hydrair* H-25 . . . a torque converter equipped rig recommended for drilling to 3,300 ft. with 4½" drill pipe and wire line servicing to 9,000 ft. when powered with an engine developing a total of 200 H.P.

The *Hydrair* H-30 is a torque converter equipped rig recommended for drilling to 4,500 ft. with 4½" drill pipe and wire line servicing to 10,000 ft. when powered with an engine developing a total of 310 H.P.



The *Hydrair* H-38 . . . a torque converter equipped rig recommended for workover to 6,000 ft. with 4½" drill pipe and for wire line servicing to 16,000 ft. when powered by an engine developing a total of 400 H.P.

The *Hydrair* H-20 . . . a torque converter equipped rig recommended for workover to 2,500 ft. with 4½" drill pipe, 4,900 ft. with 3" tubing, and for wire line servicing to 7,500 ft. when equipped with an engine developing a total of 200 H.P.

with coal liquefaction. Part of them could be rebuilt and put on stream after varying periods of time.

The two largest of the hydrogenation plants, at Wesseling and Gelsenberg, have been included in the crude-oil refining program for some time and soon will have a total throughput capacity of 1,550,000 tons a year. Another hydrogenation plant, Scholven-Chemie, A.G., at Gelsenkirchen-Buer, has been approved for processing German and foreign crude oil by the O.E.E.C. committee.

After addition of a catalytic cracking plant, Scholven is believed able to take up production in about a year with a capacity of 400,000 tons a year. Arrangements were made earlier this year by Scholven with the German subsidiary of Anglo-Iranian Oil Co., Ltd., for a supply of crude. To what extent these arrangements have been affected by the nationalization program in Iran is not known.

Gasoline inferior.—The fourth hydrogenation plant, Ruhrbau, GmBH., at Bottrop-Welheim, presumably would be available for coal liquefaction, but it is recognized that motor fuel produced from coal at Bottrop-Welheim or, for that matter, any of the other plants could not compete with refined gasoline considering present prices in West Germany.

In the case of the Fischer-Tropsch synthesis plants, production of gasoline was a secondary objective and the quality of the product was not outstanding. These plants were, however, valuable as a source of material for soap and detergent production, solvents, and other chemicals. Operators of the Fischer-Tropsch plant, at Wanne-Eickel, intend to use part of its equipment for the synthesis process until the changeover to the Oxyl process, for the production of higher alcohols, is completed.

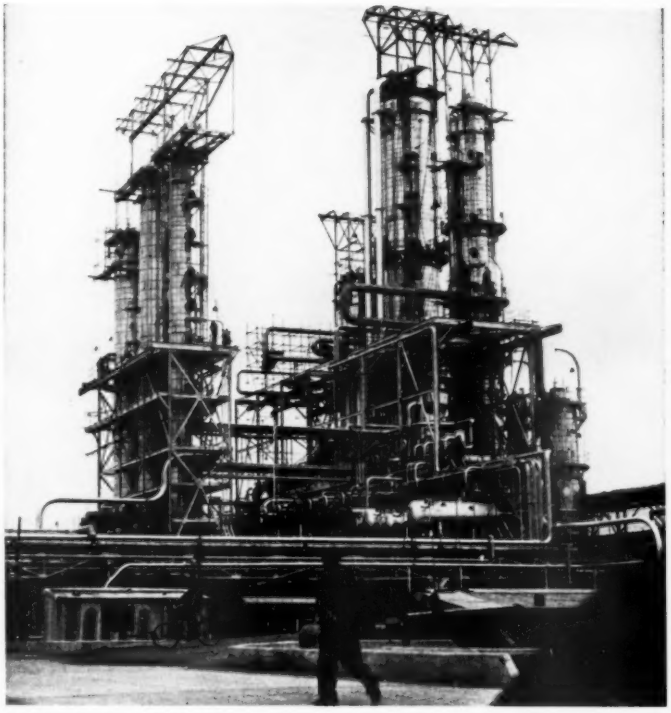
Another, at Bergkamen, will be devoted to a new process for the catalytic treatment of coking gas to obtain some liquid products, mainly hydrocarbons and alcohols. The other four Fischer-Tropsch plants are at Castrop-Rauxel, Homberg, Oberhausen-Holten, and Dortmund.

Shell Plant Grows

Stanlow capacity tripled by new distillation unit

SHELL interests have placed a second big distillation unit in operation at Stanlow refinery in Cheshire. The new unit, completed nearly a month ahead of schedule, expands the refinery's capacity to 3,000,000 tons per year—triple what it was before the new still went on stream.

Five more units, including a catalytic cracker on which work is well advanced, remain to be completed. The new installations will permit a variation in production of refined products to suit market demands.



NOW OPERATING.—This is the second crude distillation unit to be completed at the Stanlow refinery. The entire refinery is expected to be finished by next January.

The refinery went on stream in November 1949, but is not scheduled for final completion until January 1952.

New facilities here will form part of a 30,000,000-lb., post-war refinery-expansion program that Shell has undertaken in the United Kingdom. This includes the Shell Haven refinery in Essex, now in full operation with an annual capacity exceeding 2,000,000 tons per year and a plant at Heysham, Lancs, with a capacity of over 1,500,000 tons annually.

Shell has a related project at Pernis, Holland, near Rotterdam. This enlarged refinery processes more than 4,000,000 tons of crude per year.

The four refineries—Pernis, Shell Haven, Stanlow, and Heysham—are sited to serve the northern European market as economically as possible. Including refineries in France, Germany, and Italy, Shell now has a refining capacity in Western Europe of about 20,000,000 tons per year.

AFRICA

Groundnuts Line to Be Sold

The 130-mile, 6-in. products pipe line built 2 years ago in East Africa as a part of the British Government's groundnuts development project is slated to be dismantled and sold.

The line was laid by Shell Petroleum Co. on behalf of Britain's Overseas Food Corp. from a coastal terminal at Mtwara to Nachingwea in Tanganyika. The groundnuts (peanuts) development scheme involved use of large quantities of petroleum products, and existing transportation facilities were inadequate.

A report from Dar es Salaam said the line had never been operated at capacity and that it was costing the equivalent of about $1,000 a week for maintenance.

The news concerning the dismantling of the Tanganyika line follows the decision to abandon plans for the construction of another petroleum products line in East Africa. This was the line which the Southern Rhodesian Government proposed for construction from Beira in Portuguese East Africa into Southern Rhodesia.

An investigation of right-of-way, construction, and cost features of the line led to abandonment of the project. The original proposal resulted from petroleum supply difficulties in Rhodesia, due in large part to present inadequate rail and highway transportation. The Portuguese have announced new rail tank cars are being delivered for the Beira-Rhodesia line this summer.

Gas Veteran

Schmidt named assistant to president of East Ohio

JACOB J. SCHMIDT, general production superintendent of East Ohio Gas Co. at Cleveland, was last week named to the newly created post of assistant to the president.

In his new position, Schmidt will continue as head of the company's production and storage operations in addition to his enlarged duties as aid to East Ohio's president, W. G. Rogers.

Schmidt, who began his career in the natural-gas business by working as a surveyor during summer vacations while still a student at Indiana University, first joined East Ohio on a full-time basis in June 1924. Beginning as a geologist, he was appointed general production superintendent 8 years later, in October 1932.

An authority on petroleum geology, his work on the problems of underground storage of natural gas has received recognition in several scientific organizations and publications. As one result of his contributions to the subject of subsurface storage, he was named a fellow in the Ohio Academy of Science in 1946.

Louis H. Morris, formerly with Petrex Oil Corp. at Houston, has opened a geological consulting office in Midland, Tex.

Edward R. Kleberg, John A. Mobley, and **Leslie S. Lockett,** all of Corpus Christi, Tex., have formed the Poso Seco Oil Co.

Robert T. Raney has been appointed manager of the Edna, Tex., plant of Houston Natural Gas System. Raney, who has more than 10 years' service with the company, was formerly a service representative in the Alvin, Tex., district.

Maxwell Graham, of Carter Oil Co., Tulsa, left last week for Venezuela where he will work with Creole Petroleum Corp. as assistant gravity-meter operator.

Donald Towse, formerly with Amerada Petroleum Corp. at Casper, Wyo., has been appointed assistant professor of geology at the University of North Dakota. Dr. Towse is studying the subsurface stratigraphy of the state for the North Dakota Geological Survey and will do consulting work in the Rocky Mountain region.

Joseph L. Hargrove has resigned his position as petroleum engineer with Texas Eastern Transmission Corp. to operate the newly formed Hargrove Oil & Gas Co. at Shreveport, La. Offices will be opened September 1.

R. R. Rothrock, field superintendent for Sunray Oil Corp. at Barnsdall, Okla., has been promoted and transferred to Oklahoma City as district engineer.

Richard J. Sanders, geologist for Continental Oil Co., has been transferred from Elko, Nev., to Salt Lake City in the same capacity.

John H. DeFord, consulting geologist and independent oil operator, has closed his office in Midland, Tex., and has opened offices in Abilene, Tex., where he will be associated with **C. T. McLaughlin,** drilling contractor and oil operator of Snyder, Tex. Before becoming an independent in 1950, DeFord was division geologist with Bay Petroleum Corp.

G. P. Crawford, assistant district geologist in Stanolind Oil & Gas Co.'s West Texas district office at Midland, has been transferred as district geologist to the newly established district office at Roswell, N. M. The office was opened August 1 and will be known as the Southeast New Mexico district office. Crawford has been with the firm since 1943.

James R. Calkins, recent graduate in chemical engineering of Massachusetts Institute of Technology, has joined the research and development staff of Sun Oil Co. at Marcus Hook, Pa. Three other recent graduates in chemical engineering have joined the firm. They are **Peter S. Hepp,** graduate of University of Pennsylvania; **Oscar A. Klamer,** graduate of University of Illinois; and **Eleanor A. Greiner,** graduate of Drexel Institute.

C. L. Crenshaw, general manager of Shallow Water Refining Co. for the past 12 years, has joined Berry Asphalt Co. at Stephens, Ark., as superintendent of the refinery there. Prior to joining Shallow Water he was general manager for Lake Refining Co., Gladewater, Tex.

H. E. Wright has resigned as district engineer in the Midland, Tex., district office of Hiawatha Oil & Gas Co., and has moved to Dallas to be assistant production engineer for San Juan Oil Co. He has been with Hiawatha in Midland for the past 2 years.

Herbert E. Fisher, until recently chief engineer of the pipe-line department of Standard Oil Co. (Ind.), has resigned after almost 20 years with that firm and its subsidiaries to form C-R-C Engineering Co., Houston, jointly with Crutcher-Rolfs-Cummings, Inc. Fisher joined Stanolind Pipe Line Co. (now Service Pipe Line Co.) in 1932, was transferred to the parent company's Chicago office in 1942, and ultimately was placed in charge of all engineering and construction of products pipe lines. He served in similar capacity for Wyco Pipe Line Co., a partially owned Indiana Standard subsidiary.

Ed Howe, petroleum engineer with Stanolind Oil & Gas Co. at Shreveport, La., has been transferred to Tulsa as a reservoir engineer.

Earl Humble, former assistant manager of Texas Eastern Transmission Corp.'s Division 4 at Baytown, Tex., has been appointed assistant pipe-line superintendent for the company with headquarters at Shreveport, La.

Albert Thalman, geologist for Phillips Petroleum Co. at Corpus Christi, Tex., has been transferred to Amarillo, Tex., in the same capacity.

C. C. Sellers, who has been assigned to interpretation work in the Houston district of Sohio Petroleum Co., has been transferred to Sterling, Colo., as geophysicist. Sellers has been with Sohio since 1947.

Harold M. McClure, Jr., has been elected president of Commonwealth Pipe Line Co. and its subsidiary, Old Dutch Refining Co. His election followed a recent reorganization of directorships of the companies as a result of stock-ownership changes. Other officers are **Charles N. Tompkins,** chairman of the board; **Elmer F. Son-**

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PERSONALS

dregger, vice president and general manager; **J. L. Dalson,** vice president in charge of sales and crude procurement; **Gerald L. Stoetzer,** secretary; and **Ben H. Timmer,** treasurer and comptroller. New directors elected to the boards of the two companies are Tompkins, **J. R. Greenwood, Vaughan B. Connelly,** and **Vance W. Orr.**

Ray S. Waterman, formerly assistant chief production engineer of Arkansas Louisiana Gas Co., has joined Kirkpatrick & McGuire, consulting petroleum engineers. He will be engaged in reservoir-engineering work specializing in water-flood projects and appraisals of oil and gas properties, with headquarters at Shreveport. Prior to joining Arkansas Louisiana in 1947, he had served 4 years with Arkansas Fuel Oil Co.

Lee Patterson, Jr., formerly petroleum engineer for Taylor Refining Co. at McAllen, Tex., has joined the First National Bank in Dallas as valuation engineer.

A. G. McNeese, Jr., formerly vice president and director of the Glenn H. McCarthy Interests, has joined Houston Oil Co. of Texas as administrative assistant to the president. **Ray C. Lewis,** formerly chief geologist, has been appointed to the newly created position of manager of exploration in charge of Houston's geological, geophysical, and land departments. **Wendell L. Lewis,** formerly staff geologist with the firm, has been promoted to chief geologist. **James M. Wilson,** formerly with Magnolia Petroleum Co., has joined Houston as geophysicist in the exploration department.

John Rulison, of the Michigan Department of Conservation, has been elected president of the Michigan Geological Society, succeeding **Willard Sanger,** Pure Oil Co. **George Thomas,** Ohio Oil Co., has been elected vice president; **Margaret Applegate Kitchen,** Sun Oil Co., is secretary-treasurer; and **A. E. Slaughter,** of the Michigan Department of Conservation, is business manager.

Dr. Wilson M. Laird, state geologist, has been elected president of the newly organized North Dakota Geological Society that has been formed to serve oil men interested in the Williston basin. Other officers include **George Summers,** Pure Oil Co., vice president; **Rod Tetrick,** Magnolia Petroleum Co., treasurer; and **G. Wendel Smith,** consulting geologist, secretary.

Leon C. Smitherman and **Simon Cohen,** both of Augusta, Kans., have formed Smitherman - Cohen Drilling Co. at El Dorado, Tex.

M. Scott Kraemer, petroleum engineer for Stanolind Oil & Gas Co., has been transferred from Alvin, Tex., to Houston.

Joseph R. Autt, engineer for Carter Oil Co., has been transferred from Monroe to Natchitoches, La.

R. N. Minear, tool pusher for General Geophysical Co., has been transferred from Mount Vernon, Ind., to Waterloo, Ill.

Robert S. Breitenstein, geologist for The Texas Co., has been transferred from Farmington, N. M., to Fort Worth in the same capacity.

Frank P. Baughn, assistant to the president of San Juan Oil Co., Dallas, has retired after completing more than 30 years of continuous service with Mudge Oil Co., which was taken over by San Juan about a year ago.

Louis H. Michaelson has been promoted to division geologist for the Permian Basin of West Texas and Southeast New Mexico for Texas Gulf Producing Co. Prior to joining Texas Gulf 3 years ago, Michaelson was associated with the geological department of Skelly Oil Co. at Midland, Tex. He replaces **Charles C. Green,** who resigned several weeks ago to be an independent oil operator and consulting geologist.

Fuller H. Wilson, district geologist for Tide Water Associated Oil Co. at Jackson, Miss., has been transferred to Lafayette, La. Other changes in the firm include: **J. M. Amis,** civil engineer and surveyor at Kilgore, Tex., transferred to the Midland, Tex., office; **J. C. McFarland,** civil engineer and surveyor at Harvey, La., transferred to the Houston office; **Wynne D. Adams,** assistant geologist at Houston, transferred to the Jackson office as district geologist; **William D. Dobbs,** foreman at Odessa, Tex., transferred to Magnolia, Ark.; and **C. L. Wade,** foreman at Magnolia, transferred to Odessa. New Tide Water employes include: **Charles H. Bearman,** Kansas State College 1948, hired in the Tulsa office as assistant geologist; **Donald McNamee,** Beloit College 1951, hired as junior geologist at Houston; **Homer U. Ries,** University of Kansas 1951, hired as assistant geologist at Houston; **John L. Russell,** Baylor University 1951, hired as scout at Midland; **Joseph M. Sims,** Texas Tech 1951, hired as assistant geologist at Midland; **James P. Richards,** Oklahoma University 1951, hired as engineer trainee at Kilgore, Tex.; **John C. Broom,** University of Tulsa 1951, hired as engineer trainee at Venice, La.; **Omar L. Emrick,** Oklahoma University 1951, hired as engineer trainee at Kilgore; and **John W. Stephenson,** University of Houston 1951, hired as engineer trainee at Hobbs, N. M.

Everett A. Miller has resigned as geological scout for Superior Oil Co. in Kansas and has opened an office at Wichita, Kans., as an independent operator and consultant.

Dr. Roy R. Morse has been appointed consultant to Standard Oil Co. (Ohio), with headquarters at Regina, Sask., Canada. He retired from Shell Oil Co. last January, after 26 years' service during which he had been exploration manager, manager of the Texas-Gulf area, and director of exploration for Shell's east-of-the-Rockies region. In his new job he will report directly to **Earl D. Wallace,** vice president in charge of production.

Dr. John E. Kircher, widely known industrial chemist, has been appointed manager of Continental Oil Co.'s expanded petrochemical department, with headquarters in Houston. For the past 8 months he has been director of development for Stephan Chemical Co., Chicago. Prior to that he was associated with Sharples Chemicals, Inc., Philadelphia, from 1943 to November of 1950, in research and development work. Dr. Kircher will be vice president and a director of Sharples-Continental Corp., vice president and a director of Petroleum Chemicals, Inc., and a director of Continental Oil Black Corp., which is now constructing a $1,500,000 plant near Lake Charles, La., for the manufacture of high abrasion carbon black from oil.

John F. Hunt, petroleum engineer for Shell Oil Co., has been transferred from Wichita Falls, Tex., to Oklahoma City in the same capacity.

Dan J. Kornfeld, of Wichita, has organized Empire Drilling Co., and will specialize in work in the northwestern part of the state.

Loring E. Heckman, an engineer with Columbia Gas System companies from 1928 until 1942, has rejoined the system as assistant vice president of Columbia Gas System Service Corp. After World War II began, Heckman

PERSONALS

received an appointment as senior analyst in the Office of Petroleum Coordinator (later Petroleum Administrator for War), subsequently being promoted to chief of the natural-gas section. In 1945 he became a natural-gas engineer in the gas certificates division of the Federal Power Commission, later becoming chief of that division.

W. M. Barnett and **Don S. Packer,** both formerly with Harbar Drilling Co., have organized D. & M. Drilling Co. with offices at Great Bend, Kans.

James E. Dyer has been elected vice president of Sinclair Oil Corp. He joined the organization at the time of the original consolidation in 1916, coming from Cudahy Refining Co. He is also a director and vice president in charge of transportation and distribution for Sinclair Refining Co.

Charles L. Schneider, formerly assistant to the division engineer of the southwestern producing division at Tulsa for Pure Oil Co., has been transferred to Newark, Ohio, as division engineer of the eastern producing division.

Jack Baumel, chief engineer of the Texas Railroad Commission's Oil and Gas Division, has submitted his resignation effective January 1. He will return to Venezuela as technical adviser to the government. Baumel, who has served with the commission for over 15 years, has been chief engineer since 1945 and was director of production from 1942 until 1945.

Hines H. Baker, president of Humble Oil & Refining Co., Houston, has been appointed to serve on the regional advisory committee of the National Association of Manufacturers.

Patrick E. Mackey has joined Union Producing Co. at Shreveport, La., as a geophysicist. He was formerly with Seismic Exploration, Inc.

Al L. Kraft, formerly Illinois district superintendent for The Texas Co., has joined Fox & Fox at Crossville, Ill., as general superintendent of production. He had been with Texaco 25 years when he resigned.

Albert R. Russell has resigned his position with Shell Oil Co.'s exploration drafting department in Midland, Tex., and is on his way to Saudi Arabia to join Arabian-American Oil Co.

James T. Ross, formerly district superintendent at Longview, Tex., for United Gas Corp., has been transferred to Shreveport, La., as distribution training specialist. **Paul T. Priesmeyer,** engineer at New Braunfels, Tex., has been transferred to Houston.

D. W. Chenot, exploitation engineer for Shell Oil Co., has been transferred from the regional Los Angeles offices to the division at Ventura, Calif.

Jerry E. Upp has joined Sinclair Oil & Gas Co. as assistant division geologist of the central division with headquarters in Tulsa. He was formerly senior geologist with Amerada Petroleum Corp.

C. S. Yust, petroleum engineer for Humble Oil & Refining Co. at Houston, has been transferred to Bakersfield, Calif., as tool pusher.

Charles H. McNeese, of Continental Oil Co.'s coordinating and planning department, Ponca City, Okla., has been transferred to Houston for special assignments in the field of evaluation in the firm's royalty and exploration departments.

F. Y. Hutchison, chief engineer of Houston Pipe Line Co., has been promoted to consulting staff engineer for Houston Oil Co. of Texas and its subsidiaries. Hutchison has been chief engineer for the pipe-line company since 1925. **J. Russell Wait, Jr.,** succeeds Hutchison.

R. E. Davis has been promoted from supervisor to assistant vice president of Southern Geophysical Co. in charge of the firm's Permian Basin division office at Midland, Tex. Other promotions announced include: **R. H. Dana,** from vice president to executive vice president; and **W. D. Baird,** from treasurer and supervisor to vice president of the firm.

Dan Kralis and **J. C. Stamm,** coowners of Geo-Service, consulting geological firm, at Abilene, Tex., have announced the following recent additions to their staff: **Percy Prout,** former district geologist for Mid-Continent Oil Co., at Midland, Tex.; **Tom Witty,** graduate geologist of University of Oklahoma; **Bill Roper,** formerly geologist with Pan American Oil Co.; **Walford Popejoy,** graduate geologist of University of North Dakota; **Bill Womack,** graduate geologist of Texas Technological College; **Bill Bourland,** graduate geologist of Texas Tech; **Aubrey Ott,** graduate geologist of Southern Methodist University; **Bill Garms,** graduate geologist of University of Colorado; and **Andrew Warner,** graduate geologist of University of Texas.

Frances Clarkson, consulting geologist, has opened an office with Casa Grande Oil Co. at Corpus Christi.

David Moore, formerly with Superior Oil Co. in California and Wyoming, recently joined Hancock Oil Co. in charge of its new Rocky Mountain offices at Casper, Wyo. **Vance Katherman,** formerly with Brinkerhoff Drilling Co., has joined Hancock as geologist in the new division offices.

Arthur B. Allyne has been appointed assistant general manager of Honolulu Gas Co. and Pacific Refiners, Ltd., both of Honolulu, Hawaii. He was formerly gas engineering consultant for Ebasco Services, Inc., of New York City. He will assume his new duties September 1.

C. R. Vandervoort, independent oil operator, has been appointed manager of a new district office being established at Midland, Tex., by Midstates Oil Corp., of Tulsa.

DEATHS

Earle S. Porter, 62, vice president and director of Amerada Petroleum Corp., Tulsa, died August 14 in St. Louis following an operation. Porter had been with Amerada 30 years, had been a vice president since 1938 and a director since 1948. He joined the company in 1921, became assistant to the vice president in 1923, and was named manager of production in 1927. Before joining Amerada he had been assistant professor of chemistry at the University of Oklahoma and assistant director of the research laboratory of E. I. du Pont de Nemours & Co., Inc.

Earl A. Gray, 39, senior petroleum engineer in the general offices of Richfield Oil Corp., died in Los Angeles on August 10. He had been with the company since 1937.

W. B. Watkins, 65, retired El Dorado, Ark., oil man, died of a heart attack during a baseball game there on August 6. Before retiring in 1936 he had been division production superintendent for Standard Oil Co.

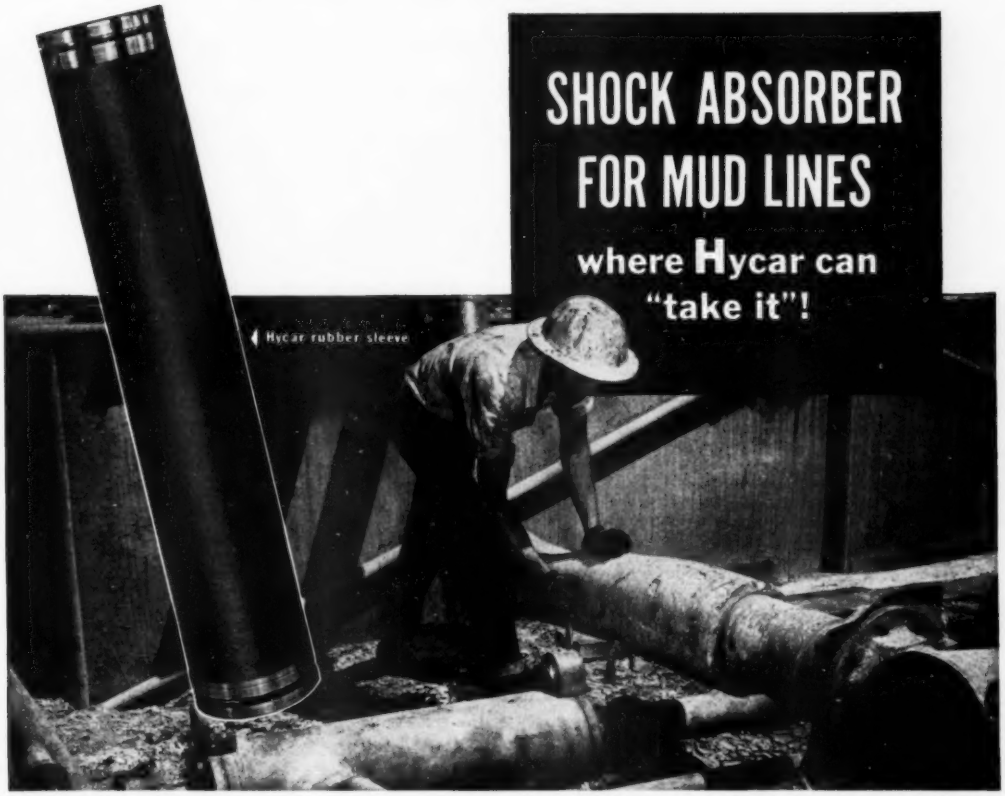
Rufus Ernest Hardy, 64, paint foreman for Sinclair Oil & Gas Co., died in Tulsa August 7. He had been with the firm for 20 years.

Robert Myron Griffith, 72, retired Tulsa oil field driller, died at Vinita, Okla., August 11.

Earl Coffman, 78, oil lease broker for D. G. Powell Oil Co. at Tulsa, died there August 13.

Another new development using

B. F. Goodrich Chemical Company *raw materials*



Desurger installed on a mud line on a rotary drilling rig on the Gulf Coast.

"Fluidynamic Desurger" made by Valve Engineering & Development Co., Tulsa, Oklahoma. Hycar rubber sleeve made by F. H. Maloney Co., Houston, Texas.

MANY devices have been tried to "soak up" shocks caused by reciprocating pumps or sudden valve-closure in a fluid-carrying line. The most successful of these to come along is the Hycar-equipped "Desurger", pictured here.

The Desurger consists of two specially designed pipes, one inside the other. The inside pipe has a series of throttling orifices. The chamber between the two pipes is divided by a Hycar rubber sleeve.

By means of pressure throttling through the pipe orifices, and the action of the Hycar sleeve, damaging shocks are greatly reduced. Mud pump valve, liner and bearing life is increased, fuel consumption drops, protection to workmen against rotary hose failure is improved.

Naturally, the Hycar sleeve must withstand terrific punishment from the hammering drilling fluid. But Hycar can "take it". For Hycar has exceptional resistance to the effects of abrasive mud, gas, oil, heat and cold—and more damaging factors.

Hycar rubber compounds are used in many ways, in many fields. They may help you improve or develop products to do new time-and-money-saving jobs. Demand for Hycar exceeds supply, but limited quantities are available for development work. For helpful technical advice, please write Dept. HF-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

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Need high tensile strength? Hycar has it—plus abrasion resistance and more advantages.

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Texas Continues Conservation Progress

Secondary-recovery projects noteworthy, particularly along the Gulf Coast area of state

by Jack K. Baumel* and James A. Hall†

TEXAS continues to move forward in its efforts to achieve the ultimate in conservation of its natural resources and with a distinct goal in mind by its regulatory authorities of obtaining the greatest ultimate recovery of oil and gas in every field possible.

Since its first proration order was written in 1929, much progress has been made in the field of conservation. Many experiments have been tried and proven. Numerous programs directed at conserving these valuable resources have passed through the planning stage into actual and accomplished realities.

At the present time Texas has over 2,400 prorated oil fields alone, as well as numerous gas fields. The June 1951 calendar-day allowable for Texas crude oil totals 2,939,868 bbl. per day.

*Chief engineer and †assistant chief engineer, Texas Railroad Commission, Austin.

The estimated production of natural gasoline and distillate during that month is approximately 360,726 bbl. per day. Thus, the total Texas allowable for June 1951, including natural gasoline and distillate, amounts to more than 3,300,000 bbl. daily.

Much credit is due the oil and gas industry which has worked diligently in cooperation with the Railroad Commission of Texas in its efforts to continually increase ultimate recovery through every scientific means possible.

Secondary-recovery projects have been noteworthy along this line. While many plants of that nature have been erected as monuments to conservation in almost every section of the state, a substantial number have been concentrated along the Texas Gulf Coast area. This is especially true in Railroad Commission Districts 2, 3, and 4, where there is a tremendous concentration of such projects. (See accompanying tabulation).

It will be noted from tabulation as prepared from Railroad Commission records that the majority of such projects call for gas injection, although a substantial number are a combination of both gas and water injection. Some, of course, where suitable to the particular reservoir, inject only water as a means of secondary recovery.

The purposes of fluid injection projects now in operation on the Texas Gulf Coast are based usually on one or more of the following:

1. To prevent excessive liberation of gas dissolved in the reservoir oil and to maintain the viscosity of the reservoir oil at near its minimum value.

2. To prevent loss of oil due to gas-cap shrinkage.

COMMISSION DISTRICT NO. 2

Field—	County	Reservoir	Principal operator	Injection fluid or fluids	Year of discovery	Avg. depth to top of pay (ft.)	Avg. net pay thickness (ft.)
1. Burnell, South	Karnes	Pettus, Eoc.	Luling Oil & Gas Co.	Gas and water	1937	3,600	16
2. Burnell, South	Karnes	Pettus, Eoc.	Blanco Oil & Al Buchanan	Gas	1937	3,600	16
3. Coletto Creek, South	Victoria	Willemin (Frio)	Jergins Oil Co.	Gas	1947	4,623	12
4. Falls City	Karnes	Lower Pawelek (Wilcox)	Southern Minerals Corp.	Water	1944	6,050	16.1
5. Holzmark	Bee	Upper Pettus	Gasoline Prod. Corp.	Gas	1935	2,990	5
6. Pettus	Bee	Pettus sand	Union Prod. Co.	Gas	1929	3,900	19
7. Pettus, New	Bee	Pettus sand	Sun Oil Co.	Gas	1930	3,646	9
8. Porter	Karnes	Pettus sand, Porter Unit	Magnolia Pet. Co.	Gas and water	1943	3,950	10
9. Pridham Lake	Victoria	Tyng	Taylor Ref. & Rupert Cox	Gas	1944	4,680	13
10. Pridham Lake, West	Victoria	Tyng	Taylor Ref. & Rupert Cox	Gas	1946	4,764	14
11. White Creek	Live Oak	Yegua, Eoc.	H. A. and M. B. Johnson	Gas	1939	1,500	9
12. Wyrick	Refugio	Frio, Olig.	Clymore Pet. Corp.	Gas	1947	4,944	8

COMMISSION DISTRICT NO. 3

13. Amelia	Jefferson	Frio 6 (Langham)	Humble Oil & Ref. Co.	Gas	1936	6,700	15
14. Esperson Dome	Liberty	Middle Yegua	General Crude Oil Co.	Gas	1938	8,100	20
15. Esperson Dome	Liberty	Basal Yegua	General Crude Oil Co.	Gas	1938	8,210	38
16. Esperson Dome, South	Liberty	Crockett sand	General Crude Oil Co.	Gas	1939	7,440	80
17. Fairbanks	Harris	Yegua	Amerada Pet. Corp.	Gas	1938	6,700	33
18. Joe's Lake	Tyler	First Wilcox	American Republics Corp.	Gas and water	1936	7,600	11
19. Joe's Lake	Tyler	Second Wilcox	American Republics Corp.	Gas and water	1936	7,660	18
20. Joe's Lake	Tyler	Third Wilcox	American Republics Corp.	Gas and water	1936	7,710	3
21. Kirby	Liberty	Middle Yegua	General Crude Oil Co.	Gas	1943	7,000	10
22. Lovells Lake	Jefferson	Upper Frio	Humble Oil & Ref. Co.	Gas	1938	7,695	5
23. Lovells Lake	Jefferson	Lower Frio	Humble Oil & Ref. Co.	Gas	1938	7,750	20
24. Markham	Matagorda	Frio	Magnolia Pet. Co.	Water	1936	4,200	
25. Midfields	Matagorda	West Zone sand	Sun Oil Co.	Gas	1946	9,070	10
26. Old Ocean	Brazoria and Matagorda	Armstrong	J. S. Abercrombie Co.	Gas	1936	9,700	50
27. Old Ocean	Brazoria and Matagorda	Chenault	J. S. Abercrombie Co.	Gas	1936	9,400	50
28. Old Ocean	Brazoria and Matagorda	Larsen	J. S. Abercrombie Co.	Water	1936	10,300	
29. Olive	Hardin	Wilcox	Pan American Prod. Co.	Gas	1945	9,945	
30. Oyster Bayou	Chambers	Seabreeze (Frio)	Sun Oil Co.	Water	1941	8,250	200
31. Saratoga	Hardin	500 Ft. sand (Mio.)	D. D. Feldman	Water	1929	500	25
32. Seabreeze	Chambers	First Frio	Sun Oil Co.	Gas	1936	8,400	47
33. Seabreeze	Chambers	Third Frio	Sun Oil Co.	Water	1936	8,400	30
34. South Gillock	Galveston	Big Gas sand	Pan American Prod. Co.	Gas	1948	9,100	40
35. Sugarland	Fort Bend	Frio	Humble Oil & Ref. Co.	Gas	1928	2,500	85
36. West Columbia, New	Brazoria	Frio (West Block)	The Texas Co.	Water	1942	5,250	110
37. Withers, North	Wharton	Frio (A Zone)	Michaux et al	Water	1936	5,300	20

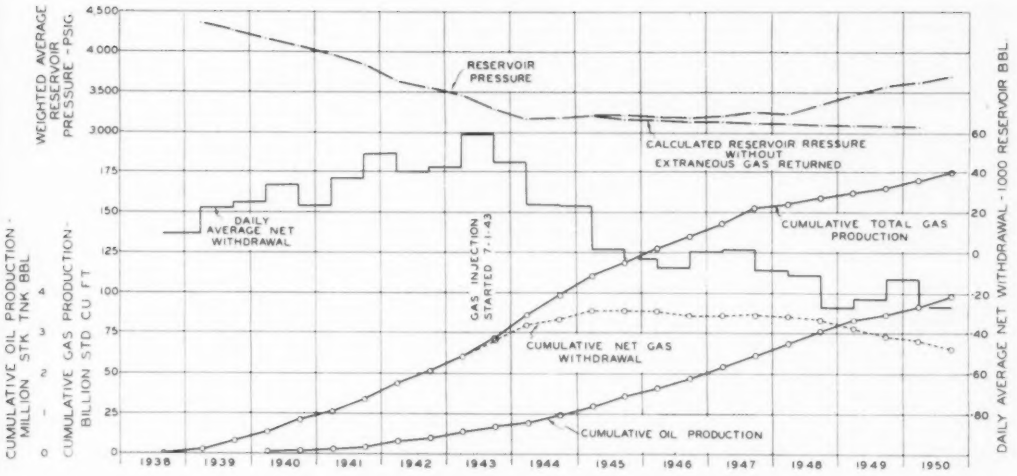


Fig. 1—Pressure and production history, Chenault reservoir, Old Ocean field, Texas.

3. To conserve gas for future use.

4. To substantiate higher maximum efficient rates.

5. To increase production of marginal properties.

6. To dispose of salt water produced with oil.

7. To keep wells flowing and avoid the expense of pumping equipment.

Let us refer, for instance, to Figs. 1 and 2, "Pressure and Production History of the Chenault and Armstrong Reservoirs in the Old Ocean Field," located in Brazoria and Matagorda counties. The Armstrong and Chenault reservoirs in that field are typical examples of high-pressure pressure-maintenance programs in large reservoirs.

Then, let us take a look at two other areas, one known as the "Porter Field Unit," the other being the "Clara Driscoll Upper First Government Wells Reservoir." A graphic history of the Porter Field Unit is reflected in one chart (Fig. 3) while a reser-

COMMISSION DISTRICT NO. 2

Field--	Average porosity (%)	Avg. horizontal permeability (md.)	Average oil gravity (°A.P.I.)	Original reservoir pressure (psi.)	Bubble point pressure (psi.)	Subsequent average reservoir pressure (psi.)	Date of subs. avg. reservoir pressure	Approximate stage of depletion	Remarks
1. Burnell, South			46.8	500				Marginal	
2. Burnell, South			46.8	500				Marginal	
3. Coletto Creek, South	30	800	25	1,980	1,980	1,590	Nov. 1950	Intermediate	
4. Falls City	24.5	311	39.2	2,625	797	2,390	Jan. 1949	Flush	Pressure maintained
5. Holzmark			40					Marginal	
6. Pettus	38.2	452	44.7	Normal for depth original		189	Aug. 1950	Intermediate	Pressure slightly inc.
7. Pettus, New			47					Intermediate	
8. Porter	36	390	48	1,730	1,730	832	Aug. 1950	Intermediate	Pressure maintained
9. Pridham Lake	27.7	1,701	24	2,050	2,050	1,577	Sept. 1950	50 per cent	
10. Pridham Lake, West	27.3	1,680	24	2,050	2,050	1,487	Sept. 1950	50 per cent	
11. White Creek	38		21					Marginal	
12. Wyrick			40.7			575	Aug. 1949	Intermediate	

COMMISSION DISTRICT NO. 3

13. Amelia	31	1,390	30	3,135	3,135	3,030	Sept. 1950	Advanced	To prevent gas-cap shrinkage
14. Esperson Dome	26	200	43.6	2,810	2,810	2,083	Dec. 1950	24 per cent	
15. Esperson Dome	28	200	43.6	3,595	3,595	2,474	Dec. 1950	19 per cent	
16. Esperson Dome, South	27.3	240	40.5	3,512	3,380	2,720	Dec. 1950	15 per cent	Pressure maintained
17. Fairbanks	28	2,000	36	3,020	3,020	1,650	Nov. 1950	Advanced	
18. Joe's Lake	18	160	46	3,500		2,920	Mar. 1949	Intermediate	Pressure maintained
19. Joe's Lake	23	171	45	3,555	3,555	2,690	Mar. 1949	Intermediate	Pressure maintained
20. Joe's Lake	20	50	39.5	3,550		2,400	Mar. 1949	Intermediate	
21. Kirby	27.6	213	38.8	3,400		1,800	Aug. 1948	Intermediate	Pressure maintained
22. Lovells Lake	29	700	41	3,580	3,580	3,250	Nov. 1948	Advanced	
23. Lovells Lake	28	700	38	3,610	3,610	3,041	Nov. 1948	Flush	
24. Markham									Primarily s.w. disposal
25. Midfields	24	700	42.5	4,500	4,500	4,315	Sept. 1950	Flush	
26. Old Ocean	26	1,700	36.5	4,658	4,658	3,764	Oct. 1950	Intermediate	Pressure maintained
27. Old Ocean	27	590	36.0	4,472	4,472	3,718	Oct. 1950	Intermediate	Pressure maintained
28. Old Ocean	23	650	34	5,200	5,200	4,334	Dec. 1950	Intermediate	
29. Olive		10	40	6,300					
30. Oyster Bayou	28	1,000	36	3,800	3,800	3,194	Mar. 1950	Intermediate	
31. Saratoga			15					Marginal	
32. Seabreeze	27	750		3,810	3,810	3,040	Nov. 1950		Discont. April 1947
33. Seabreeze	26	600		3,880	3,880	3,070	July 1950		Pressure maintained
34. South Gillock	28.4	1,527		4,240	4,240	3,370	Nov. 1949	Flush	To prevent gas-cap shrinkage
35. Sugarland	29	1,200	29.1	1,550	1,550	1,280	Sept. 1950	Flush	Pressure maintained
36. West Columbia, New	23		28.5	2,474	2,474	2,085	Apr. 1951	Primary	
37. Withers, North			26	2,275		2,050	June 1948	Intermediate	Primarily s.w. disposal

voir performance curve is indicated in another chart (Fig. 4) for the Clara Driscoll Upper First Government Wells Reservoir. These two are typical examples of medium-pressure pressure-maintenance in small reservoirs.

While these two types of pressure-maintenance programs ably speak for themselves in the charts referred to, a brief review of various projects throughout the Gulf Coast area of Texas will show still more the concentrated efforts on the part of the industry as well as the Railroad Commission to accomplish continued and more effective conservation through secondary-recovery projects in this state.

District No. 2

Burnell, South.—Water from a zone at 1,900± ft. is injected into Pettus sand. No evidence to indicate an effective natural water drive has been found and it is believed the injection of water will materially aid in obtaining the maximum recoverable oil. Gas from deeper oil zones is also injected near top of structure.

Coletto Creek, South.—The Willemin sand reservoir is a sand lens with a dip of approximately 100 ft.

COMMISSION DISTRICT NO. 4

Field—	County	Reservoir	Principal operator	Injection fluid or fluids	Year of discovery	Avg. depth to top of pay (ft.)	Avg. net pay thickness (ft.)
38. Agua Dulce	Nueces	Bertram	Pan American Prod. Co.	Gas	1941	6,375	21
39. Agua Dulce	Nueces	Upper Pfluger	Hiawatha Oil & Gas Co.	Gas	1941		80
40. Agua Dulce	Nueces	Wright	Gillring Oil Co.	Gas	1941	5,040	8
41. Agua Prieta	Duval	Hiawatha sand	Taylor Ref. Co.	Gas	1941	4,550	20
42. Alfred	Jim Wells	Cook (Frio)	The Texas Co.	Water	1938	4,680	30
43. Alta Mesa	Brooks	Garcia sand	Standard of Texas	Gas and water	1936	2,486	12
44. Armstrong	Jim Hogg	Brennan sand	The Texas Co.	Gas	1943	3,000	9
45. Benavides	Duval	Gravis	Shell Oil Co.	Gas and water	1937	4,780	14
46. Benavides	Duval	Parr	Hiawatha Oil & Gas Co.	Gas	1937	4,750	18
47. Ben Bolt	Jim Wells	Vicksburg	Bridwell Oil Co.	Gas	1939	5,200	30
48. Borregas	Kleberg	R 13	Humble Oil & Ref. Co.	Gas	1946	6,800	16
49. Boyle	Starr	"J" sand	Continental Oil Co.	Gas	1945	4,100	9.4
50. Brayton	Nueces	Simmonds	Arkansas Fuel Oil Co.	Gas and water	1944	7,220	50
51. Brayton	Nueces	Simmonds	Gillring Oil Co.	Gas	1944		
52. Brayton	Nueces	Perry	Puenticitas Oil Co.	Gas	1944	7,220	44
53. Brayton	Nueces	Wardner	Houston Natural Gas Co.	Gas	1944	7,090	41
54. Cadena	Duval	Hockley No. 1	Taylor Ref. Co.	Gas and water	1942	4,425	
55. Cadena	Duval	Hockley No. 2	Taylor Ref. Co.	Gas and water	1942	4,525	
56. Cadena	Duval	Sweden	Taylor Ref. Co.	Gas	1942	4,300	
57. Cam	Duval	Loma Novia	B. C. Graham & Cam Corp.	Gas	1947	2,650	5
58. Charco Redondo, East Segment "A"	Zapata	Manila	F. P. Schwab et al	Gas	1945	2,560	6
59. Clara Driscoll, South	Nueces	5,600 Ft. sand	W. F. Horsting	Gas	1939	5,560	10
60. Colorado	Jim Hogg	Colorado (Cockfield)	Humble Oil & Ref. Co.	Water	1936	3,000	6
61. Conoco Driscoll	Duval	Upper First Government Wells	Continental Oil Co.	Gas	1924	2,800	
62. East	Jim Hogg	Pettus	Sun Oil Co.	Gas	1942	4,721	5.5
63. Escobas	Zapata	Mirando	Dulaney Oil Co.	Water	1928	1,200	24
64. Garcia	Starr	Frost "A"	Sun Oil Co.	Gas	1942	3,377	7.3
65. Govt. Wells, North	Duval	Government Wells	Texas Co., Shell and Sun	Gas and water	1928	2,270	15
66. Govt. Wells, South	Duval	Government Wells	Reed & McKay	Gas	1929	2,375	
67. Guerra	Starr	Guerra sand	Sun Oil Co.	Gas and water	1933	2,220	14
68. Hoffman	Duval	Lower Cole	Cox & Hamon	Water	1935	2,300	
69. Hoffman	Duval	Argo	Cuellar Bros.	Water	1935	2,580	22
70. Jennings	Zapata	Mirando	The Texas Co.	Gas and water	1925	1,200	14
71. Kennard	Starr	Coates	Taylor Ref. Co. and W. D. Kennard	Gas	1947	3,500	10
72. Killam	Webb	Mirando	O. W. Killam	Water	1941	2,000	20
73. Loma Novia	Duval	Loma Novia	Humble Oil & Ref. Co.	Gas and water	1934	2,800	16
74. Longhorn, East	Duval	Woodley sand	Hiawatha Oil & Gas Co.	Water	1945	5,125	40
75. Longhorn, South	Duval	Cole sand	Hiawatha Oil & Gas Co.	None currently	1948	4,220	20
76. Longhorn, South	Duval	Hiawatha	Hiawatha Oil & Gas Co.	None currently	1948	5,780	11
77. Lopez	Webb	Mirando	Superior Oil Co.	Gas	1935	2,190	18
78. Luby	Nueces	First 4,300 Ft. sand	Stanolind	Gas	1938	4,330	15
79. Luby	Nueces	Second and third 4,300 Ft. sand	Stanolind	Gas	1937	4,350	22
80. Luby	Nueces	5,000 Ft. sand	Stanolind	Gas	1937	5,050	25
81. Manila	Jim Hogg	Lower Pettus	Magnolia Pet. Co.	Water	1940	2,600	
82. O'Hern	Webb		Magnolia Pet. Co.	Gas	1924		
83. Piedras Pintas, Segment "A"	Duval	Upper Govt. Wells	Coast Oil Corp.	Gas	1945	3,469	
84. Piedras Pintas, Segment "A"	Duval	Lower Govt. Wells	Coast Oil Corp.	Gas	1945	3,670	
85. Piedre Lumbre	Duval	Government Wells	The Texas Co.	Gas and water	1935	1,600	10
86. Plymouth	San Patricio	Heep sand	Plymouth Oil Co.	Gas and water	1935	5,600	
87. Plymouth	San Patricio	Plymouth sand	Plymouth Oil Co.	Gas and water	1935	5,500	
88. Richard King	Nueces	Upper 5,400 Ft. A	Southern Minerals	Gas	1937		
89. Richard King	Nueces	5,200 Ft. A	Southern Minerals	Water	1937		
90. Robinson	Duval	Government Wells	Taylor Ref. Co. and Butcher Arthur	Water	1943		8
91. Rooke	San Patricio	7,100 Ft. "B" sand	Plymouth Oil Co.	Gas	1942	7,100	
92. San Pablo	Jim Hogg	Yeager sand	Chicago Corp.	Gas	1948	3,850	8
93. Sinton	San Patricio	Top member basal Frio	Tide Water Assoc. Oil Co.	Gas	1941	6,675	
94. Southland	Duval	Cole sand	Hiawatha Oil & Gas Co.	Gas and water	1939	3,950	8
95. Squire	Duval	Strake	John F. Camp & Sons	Gas	1947		30
96. Squire	Duval	Squire	John F. Camp & Sons	Gas	1947		15
97. Squire	Duval	Pettus	John F. Camp & Sons	Gas	1947		6
98. Squire	Duval	Yegua	John F. Camp & Sons	Gas	1947		20
99. Tijerina Canales Blucher	Jim Wells	6,000 Ft. sand	The Texas Co.	Gas	1944	6,000	6
100. Tijerina Canales Blucher	Jim Wells	No. 2 sand	Humble Oil & Ref. Co.	Gas	1944	6,970	
101. Turkey Creek	Nueces	Douglas sand	Renwar Oil Corp.	Gas and water	1938	5,800	
102. Weil	Jim Hogg	Pettus sand	Sun Oil Co.	Gas and water	1943	5,030	9.6
103. White Point, East	San Patricio	Brigham sand, Sec. 63 Seg.	Plymouth Oil Co.	Gas		5,600	
104. Willamar	Willacy		Humble O. & R. & Pan-Am				
105. Yturria	Starr	Chapotal sand	Sun Oil Co	Gas	1941	4,209	10.9

per mile, truncated updip by an up-to-the-coast fault. All casing-head gas produced in the field is injected into this sand. Reservoir has no noticeable water drive but had a small original gas cap.

Falls City. — Water produced from all reservoirs is injected into the Lower Pawelek reservoir. Pressure is maintained considerably above bubble point in order to keep wells flowing naturally. No gas is available for gas lift and cost of pumping equipment is avoided. This project has been reported by Crutchfield and Bowers in A.I.M.E. Transactions, Vol. 189.

Holzmark.—Approximately 50 M.c.f. of gas per day injected into upper Pettus sand.

Pettus.—The original gas-oil contact was at —3,523 ft. and original oil-water contact at —3,604 ft. The ratio of original gas-cap volume to oil-zone volume was 0.2. Reservoir had a weak water drive.

Pettus, New.—This field was marginal at the start of gas injection. The life of the field has been prolonged.

Porter.—The Pettus sand body forms a closed reservoir with faults on the north, east, and south. The west edge of the field is outlined by a pinch-out of the productive sand. The original gas-oil contact was at —3,660 ft. and no water-oil contact was established. The ratio of original gas-cap volume to oil-zone volume was 0.1. The dip of the producing zone is approximately 1°. Reservoir pressure remained constant at approximately 832 psi. for the year 1950. Oil wells

(Continued on page 138)

COMMISSION DISTRICT NO. 4

Field—	Average porosity (%)	Avg. horizontal permeability (md.)	Average oil gravity (°A.P.I.)	Original reservoir pressure (psi.)	Bubble point pressure (psi.)	Subsequent average reservoir pressure (psi.)	Date of subs. avg. reservoir pressure	Approximate stage of depletion	Remarks
38. Agua Dulce	25	250	43	1,836	1,836	1,509	Feb. 1951	Intermediate	Pressure maintained
39. Agua Dulce	25	650	40	3,350	3,350				
40. Agua Dulce				1,970	1,970	1,500	Nov. 1949		
41. Agua Prieta	27	Good	43.5	2,100	2,100	1,400	June 1949	Intermediate	
42. Alfred			44.7			1,852	Aug. 1947	Stripper	
43. Alta Mesa	26	444	25	947	284	338	Feb. 1948	Marginal	
44. Armstrong	24		37.5	1,420	1,420	920	Dec. 1950	50 per cent Salvage	
45. Benavides	20	500							
46. Benavides	32	625	43.7	1,952		350	Jan. 1951	Marginal	
47. Ben Bolt			42.5	2,300	2,300	1,550	Jan. 1949	Intermediate	
48. Borregas	27.1	1,137	38.4	3,895	3,895	3,780	Nov. 1950	Flush	
49. Boyle	29.5	125	44	1,700		344	Jan. 1951	Intermediate	
50. Brayton	28.4	2,100	37.9	3,320	3,320	2,955	Dec. 1950	Intermediate	
51. Brayton									
52. Brayton	29	4,690	37.9					Intermediate	
53. Brayton	24		40.3	3,170	3,170	2,685	Jan. 1951	Intermediate	
54. Cadena									
55. Cadena									
56. Cadena									
57. Cam	30	1,000	39.3	925	925	610	June 1948	Intermediate	
58. Charco Redondo, East Segment "A"	33	279		564	564	355	July 1948	Salvage	
59. Clara Driscoll, South	23			2,350		90	Sept. 1949	Intermediate	
60. Colorado	28	800		1,125	1,125	281	Nov. 1949	Intermediate	
61. Conoco Driscoll	31	458	33	1,290	1,290	1,040	Sept. 1950	Settled	
62. East	30.7	487	45.1	1,904	1,904	1,727	Dec. 1950	Intermediate	
63. Escobas			20.9					Marginal	
64. Garcia	35.4	Fair	42	1,550	1,550	1,153	Nov. 1950	Intermediate	
65. Govt. Wells, North	26	High	20.5	860		10	Oct. 1948	Marginal	Production increased
66. Govt. Wells, South								Marginal	
67. Guerra	30	Good	33	865	865	727	Mar. 1951	Intermediate	Pressure maintained
68. Hoffman			22	790		774	Oct. 1948	Intermediate	Combination disposal and P. M.
69. Hoffman	25	Good				160	June 1943	Marginal	
70. Jennings	30	50	21					Stripper	
71. Kennard	27	400				450	Sept. 1950	Salvage	
72. Killam	42	1,127						Marginal	
73. Loma Novia	29	High	23.5	1,050		150	Feb. 1940	Marginal	
74. Longhorn, East	28	400	46.5	2,300	2,300	1,140	Jan. 1951	Intermediate	
75. Longhorn, South	29	180	43	1,900		806	Jan. 1951	Intermediate	
76. Longhorn, South	28		44	2,600				Marginal	
77. Lopez			21			20	Dec. 1948	Salvage	
78. Luby	20	340	46	2,005	2,005	1,334	July 1950	Intermediate	
79. Luby	28	1,500	46	2,005	2,005	1,397	July 1950	Intermediate	Pressure maintained
80. Luby	24	1,400	46	2,300	2,300	1,900	July 1950	Intermediate	Pressure maintained
81. Manila			28.6					Salvage	
82. O'Hern			29.4					Marginal	
83. Piedras Pintas, Segment "A"	25		43					Advanced	
84. Piedras Pintas, Segment "A"	25			1,400		600		Advanced	
85. Piedre Lumbre	30	300	22.3	820		521	Mar. 1950	Late	
86. Plymouth	34	1,500		2,450		2,200	Dec. 1948		
87. Plymouth									
88. Richard King	28.9	209	39.5	2,375	2,375	1,550	Dec. 1950	Intermediate	Pressure maintained
89. Richard King									
90. Robinson	30			1,580		1,000	Aug. 1950	Intermediate	
91. Rooke	28	1,130		3,200	3,200	3,075	Oct. 1945	Intermediate	
92. San Pablo	29.5	239	40	1,500	1,500	1,201	Jan. 1951	Intermediate	
93. Sinton			43.6					Advanced	
94. Southland	25	300	41.6	1,775		912	Jan. 1951	Marginal	
95. Squire	36.4	323	27	1,274	1,274	1,210	Feb. 1951	Intermediate	Pressure maintained
96. Squire	39.5	796	26	1,290	1,290	1,260	Feb. 1951	Intermediate	Pressure maintained
97. Squire	35.0	142	34	1,545	1,545	1,490	Feb. 1951	Intermediate	Pressure maintained
98. Squire	33.1	71	37	1,590	1,590	1,365	Feb. 1951	Intermediate	Pressure maintained
99. Tijerina Canales Blucher			39	2,650		1,500	Dec. 1949	Intermediate	
100. Tijerina Canales Blucher			39	3,945		3,799	Dec. 1948	Intermediate	
101. Turkey Creek	34	2,000		2,640		2,431	Aug. 1949	Intermediate	Pressure maintained
102. Weil	26.7	296	45	2,125	2,125	1,630	Mar. 1951	Intermediate	Pressure maintained
103. White Point, East	30.8			2,570				Intermediate	
104. Willamar								Intermediate	To begin July 1951
105. Yturria	30.8	1,500	42	1,866	1,866	1,600	Dec. 1950	Intermediate	

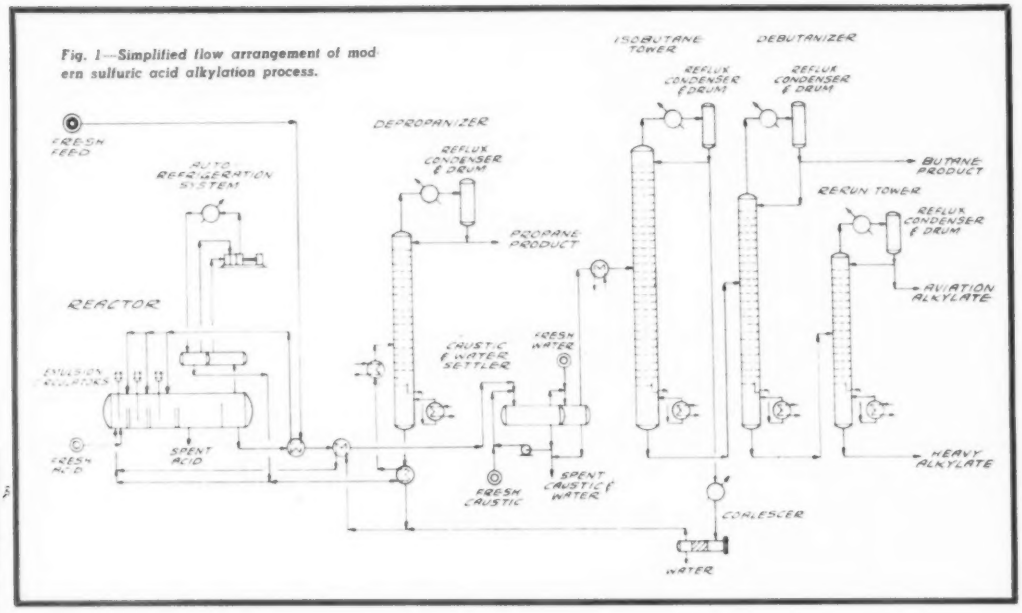


Fig. 1—Simplified flow arrangement of modern sulfuric acid alkylation process.

Sulfuric Acid Alkylation—

for motor and aviation gasolines

by J. W. Jewell, Jr.* and C. C. King*

SULFURIC acid alkylation of olefins with isobutane has been in commercial operation for almost 15 years. During this period the process has been expanded from operation on butylene only to operation on propylene, butylenes and amylenes, either separately or in mixture. In addition, numerous design improvements have led to greater capacity at no loss of product quality on existing units and lower initial investments for new plants.

*M. W. Kellogg Co. Presented at W.P.R.A. annual meeting, San Antonio.

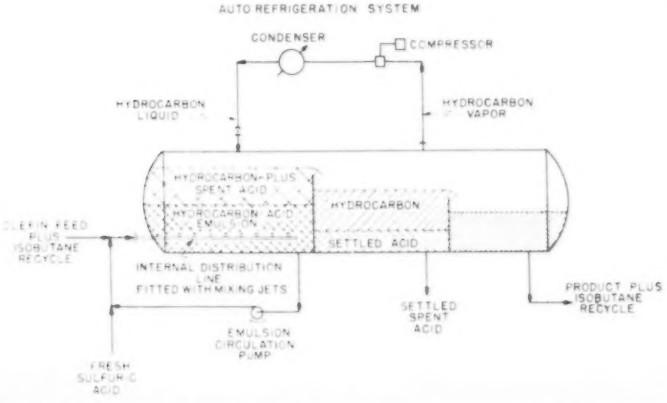
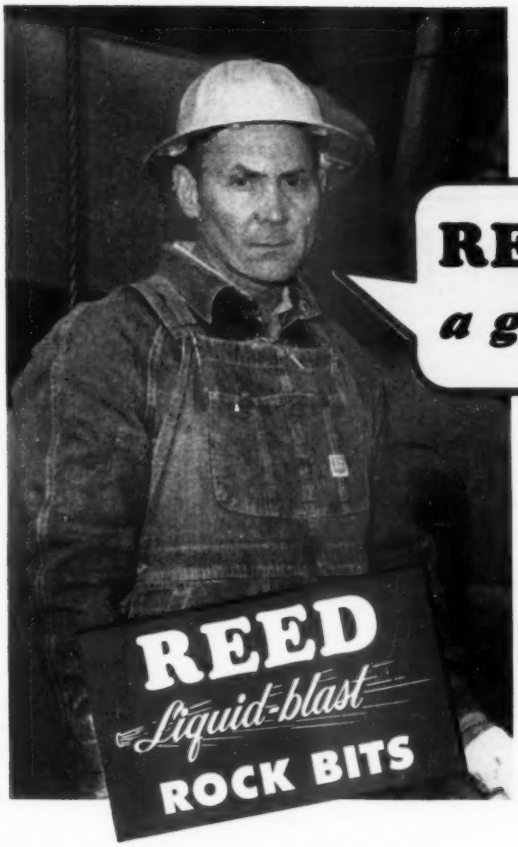


Fig. 2—Sulfuric acid alkylation reactor with external emulsion circulation and refrigeration system.

Today alkylation stands as an economically attractive process for the production of high-octane blending materials for motor gasoline and as a prime requisite for the production of aviation-gasoline blending stock. At the start of the last war alkylation was a new process in small commercial production.

During the war alkylation capacity was expanded to about 150,000 bbl. per day to meet the needs of wartime demand for aviation gasoline. Immediately after the war, a large portion of this capacity was shut down due partly to a shortage of butanes brought about by the conversion of cracking facilities to a peacetime basis and partly to a preference on the part of many refiners for catalytic polymerization. However, some time before the present international crisis developed, and in the face of constantly rising motor-gasoline octanes, refiners began again seriously to consider the improved sulfuric acid alkylation process.

Since the commencement of the



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Korean situation, midway through last year, refiners have been renovating and expanding existing alkylation units and adding rerun equipment in order to again produce aviation blending stocks. More recently the projected aviation-gasoline requirements have turned the processing spotlight fully upon the need for more alkylation capacity.

Fig. 1 shows the flow scheme of a modern sulfuric acid alkylation unit. Briefly the flow is as follows: fresh feed from storage is heat exchanged against the reactor effluent and then divided between the various reaction zones. Fresh acid and isobutane are introduced into the first reaction zone. After passing through the reaction zones the acid is settled out and withdrawn from the reactor.

The hydrocarbon effluent, consisting of alkylate and isobutane recycle, after heat exchange is caustic and water washed to neutralize any residual acidity. The isobutane recycle is then fractionated from the alkylate and normal butane in the isobutane tower following which the alkylate is debutanized. Finally, in an aviation operation, the alkylate is rerun to meet the end-point specification for aviation blending stock.

Refrigeration for maintaining reaction temperature is supplied by vaporization of light hydrocarbons in the reactor. These vapors are withdrawn, compressed, condensed, and returned to the reactor. In recent designs centrifugal compressors have been used for the refrigeration system, working out well both from the standpoint of low first cost and a good utility balance. The centrifugal compressor may be driven by high-pressure noncondensing steam and the exhaust steam used for reboiling the isobutane tower; or, it may be driven by power when high-pressure steam is not available.

The compressor condensate is concentrated in propane, so that a portion of this steam is advantageously used for purging propane from the system. The purge is fractionated in a depropanizer, the bottoms products being returned to the reactor. Typical feed compositions and alkylate yield and quality data, for such a plant, are presented in Table 1.

TABLE 1

Olefin feed	C_3	C_4	C_5
Isobutane requirement, Vol. % on olefins	132	115	112
Alkylate yield, Vol. % on olefins	178	172	155
Octanes-aviation alkylate:			
A.S.T.M. Oct. No., clear	90	94	91
F-3 or 1-C Oct. No., +4.6 cc. TEL	106	108	107
F-4 or 3-C blending index No., +4.6 cc. TEL	140-145	155-160	145-150

Fundamentally, the alkylation reaction is the combination of olefin molecules with isobutane molecules, resulting in the production of principally C_7, C_8, and C_9 isoparaffins. Control of this reaction, which is catalyzed by sulfuric acid, demands, first, an adequate supply of isobutane, and second, excellent contact or mixing of olefins, isobutane, and acid. In practice, a considerable excess of isobutane must be present in the mixture, in order to prevent the formation of olefin and acid-olefin polymers. This requirement is fulfilled in plant design by maintaining a recycling supply of isobutane to the reactor. The effectiveness of isobutane-olefin ratio is illustrated in Table 2 wherein data are shown on butylene alkylation at various ratios in an ordinary single contact reactor.

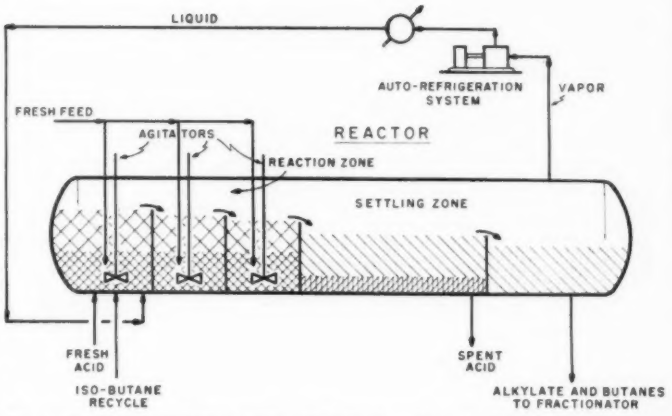

Fig. 3—Sulfuric acid alkylation reactor with internal emulsion circulation and autorefrigeration system.

TABLE 2—BUTYLENE ALKYLATION

Reactor temp., °F	35-40		
Spent-acid strength, %	90		
Isobutane/olefin ratio in feed	7:1	5:1	3:1
Yield aviation alkylate (320° e.p.) (volume per cent on olefins)	163	160	156
A.S.T.M. Oct. No., clear	93.5	92.5	91.5

Mixing of isobutane, olefins, and sulfuric acid to effect the alkylation reaction has been carried out in several different types of contacting devices in reactors. The reactor is the heart of the alkylation process and its design may have an effect upon the alkylate yield, and octane number, the consumption of sulfuric acid, and the required recycle rate of isobutane. In most of the plants built by M. W. Kellogg Co. during the last war, the reactor included a contacting section with a distributor pipe containing glass jets through which fresh feed, isobutane recycle, and fresh acid are introduced into the reaction zone. By means of an external circulation system (see Fig. 2) the mixture of acid and hydrocarbon is also circulated through this distributor in order to help maintain an emulsion and to thereby provide the best possible contact between the two phases. The spent acid and effluent hydrocarbons flow over a dam into the settling section of the reactor in which the spent sulfuric acid settles out and is drawn off. The hydrocarbon substantially free of sulfuric acid flows over another dam into a surge section and thence to fractionation.

New Mixer Design

During the war, Kellogg developed a new cascade mixer reactor design which possesses marked advantages over the older type of reactor (see Fig. 3). In the new reactor the contact between isobutane, olefin, and sulfuric acid is divided into multiple contacting zones. The reactor illustrated has three separate zones. All of the isobutane recycle and all of the fresh sulfuric acid is introduced into the first reaction zone at the left side of the drawing.

Fresh feed containing the olefins is divided into equal portions between all three zones. Flow of acid and hydrocarbon is in cascade from one zone to the next. In this manner the isobutane to olefin ratio entering each reaction zone is maintained at the highest possible level. With a reactor containing three zones and a 4:1 isobutane to olefin ratio, feeding the reactor as a whole, the isobutane to olefin ratio entering each reaction zone is more than 9:1, as opposed to 4:1 in the old-type reactor.

Because of the higher effective isobutane-olefin ratio in the cascade-type reactor a lower external isobutane olefin ratio may be used in plant design thus effecting a reduction in size of the isobutane tower and a substantial savings in plant and utility costs. Isobutane recycle is well known to be one of the most costly features of alkylation, requiring a large fractionator of normally 50 to 65 trays, with attendant reboiling facilities, to separate the isobutane recycle from the normal butane and alkylate. In the case noted a reduction in the external

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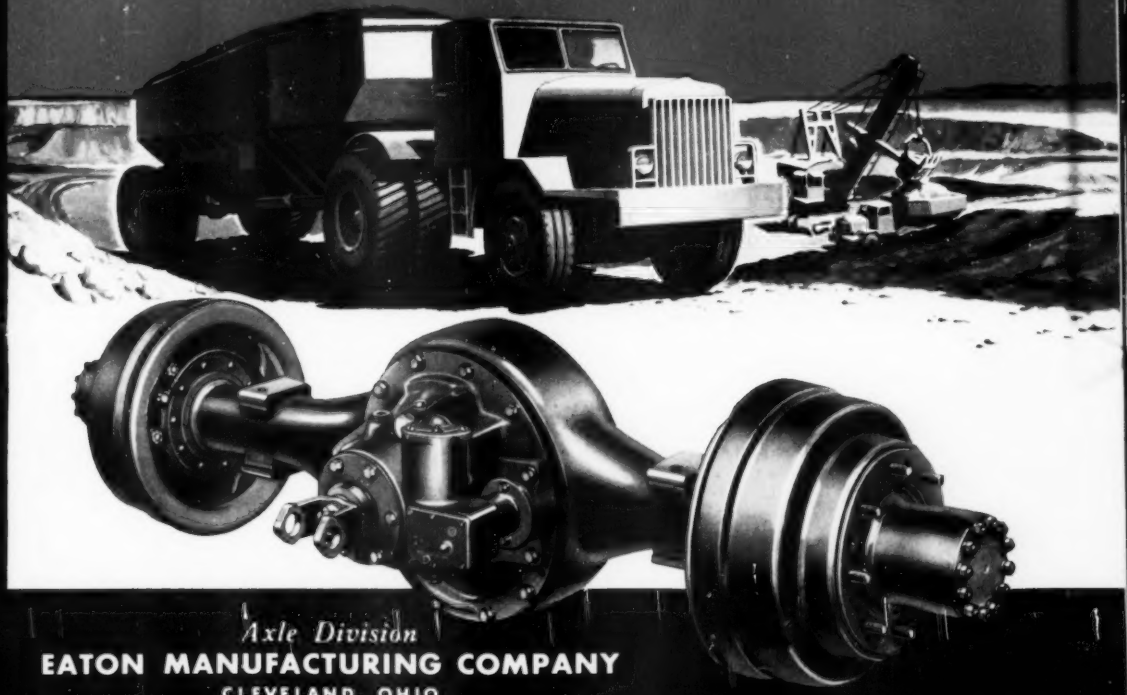

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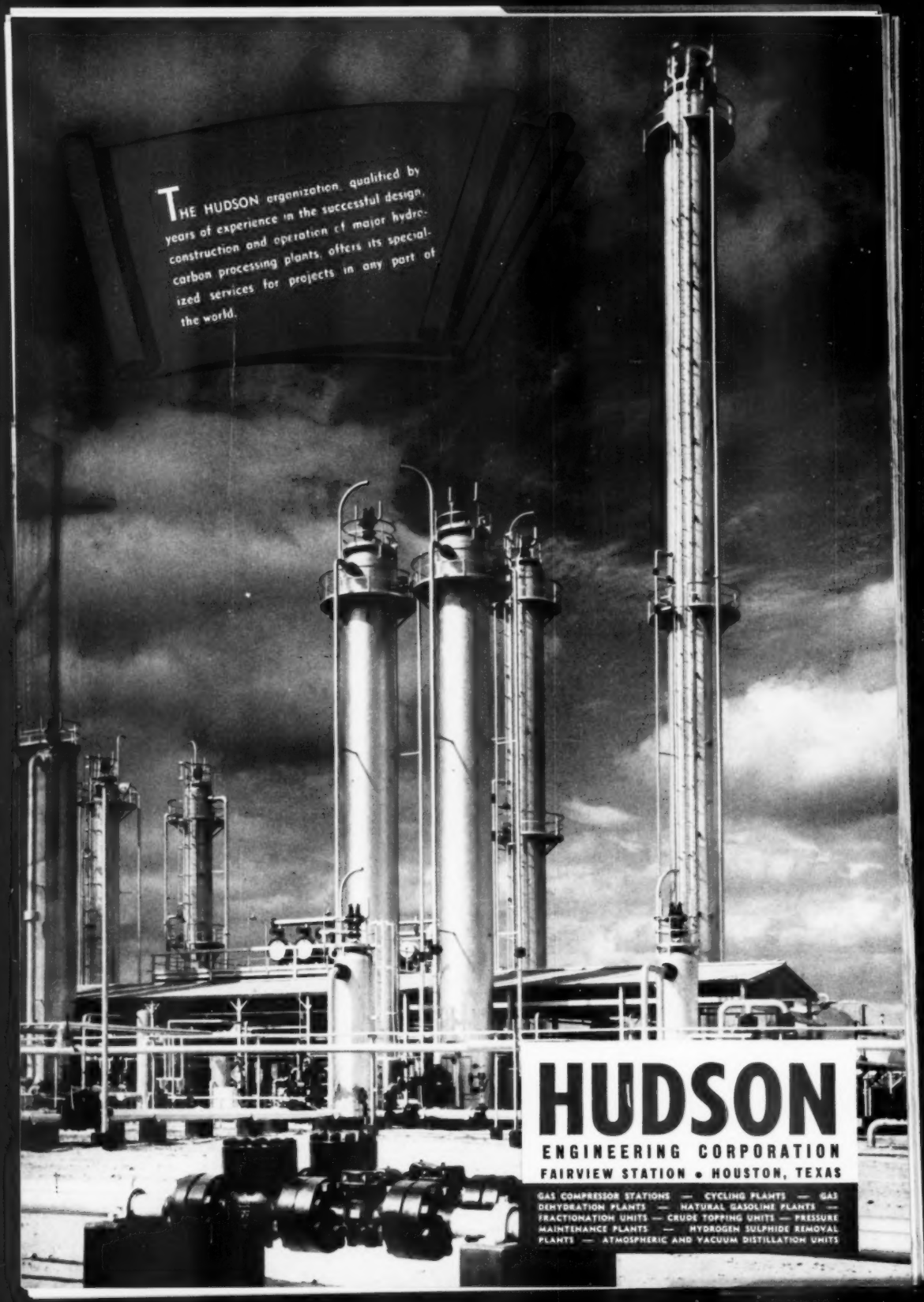
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isobutane recycle required to arrive at a 9:1 isobutane to olefin ratio in the reactor, results in a reduction of approximately 50 per cent in the required capacity of the isobutane fractionation facilities.

The foregoing advantages of maintaining a higher effective isobutane-olefin ratio, while at the same time the total isobutane in circulation is reduced, are best illustrated by the following operating data taken from a plant now in operation with a cascade reactor containing only two contacting zones. Operating on an olefins mixture of 15 per cent propylene and 85 per cent butylenes, with a reactor temperature of 35° F. and an over-all isobutane olefin ratio of only (3.8) to 1, the clear motor octane of the total alkylate has been varying from 93 to 94. This contrasts with the data on butylene alkylation showing 92.5 clear motor octane for aviation alkylate at 5:1 isobutane-olefin ratio.

Reduced Power Requirement

Another advantage resulting from the cascade mixer reactor is a material reduction in the power requirement for circulating emulsion. In the old jet reactors emulsion is circulated externally by pumps which force the acid-hydrocarbon mixture through the glass jets at a necessarily high-pressure drop in order to achieve efficient mixing. In the cascade mixer reactor no such high-pressure drop is required. As a consequence, the cascade mixer reactor uses less than 25 per cent of the power requirement of the jet reactor.

In addition to the direct power saving on emulsion circulation, the load on the auto refrigeration system is lessened to the degree that the energy put into emulsion circulation constitutes an additional load on the reactor cooling system. The over-all result of these effects is a plant power saving of approximately 20 per cent over the jet-type installation.

During the alkylation reaction, sulfuric acid undergoes degradation, or loss in acid strength, due to a buildup of organic matter in the acid. Since the alkylate product is affected by the acid strength at the point of reaction, the manner and degree to which degradation is allowed to proceed is important. For example, some data on butylene alkylation, in a single contact-type reactor, indicates a drop in alkylate octane rating of two numbers for a decrease in spent acid strength from 92 to 85 per cent. This effect is minimized in the cascade mixer reactor wherein only the acid in the final contacting zone is at the lowest strength as compared to the jet reactor wherein the total acid inventory is at spent acid strength.

Acid Consumption

Consumption of acid is dependent on a number of factors, principal among which are the nature of olefins being alkylated and the concentrations of acid entering and leaving the reactor. In normal practice fresh white 98 per cent sulfuric acid is charged to an alkylation unit. However, some plants with sulfuric acid recovery systems charge an acid to the alkylation reactor of slightly lower strength. The principal effect of this practice is to increase the circulation of sulfuric acid through the reactor and through the recovery system.

Other plants utilize spent alkylation acid for treating purposes and consequently withdraw a high-strength spent acid. Typical acid consumptions when charging 98 per cent fresh acid and withdrawing 90 per cent spent acid are 2.0 lb. acid per gallon of total alkylate for propylene alkylation, 0.6 lb. acid per gallon of total alkylate for butylene alkylation, and 1.0 lb. acid per gallon of total alkylate for amylene alkylation. When charging mixture of olefins to an alkylation reactor the acid consumption follows closely an arithmetic average based on the volume per cent of the different olefins in the feed.

Acid Reconstitution

Through the years many refiners have examined sulfuric acid alkylation and have balked at the problems of acid procurement and spent-acid

(Continued on page 151)

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Spraberry Drilling Activity Exceeds All Previous Plays In West Texas Area

At midyear there were around 300 producing and more than half as many drilling wells in 20 different Spraberry sandstone fields.

by J. H. Bartley

THE Spraberry trend play in the Midland basin portion of the West Texas Permian basin is the most active area in the United States to date.

At the present time the Spraberry trend play has overshadowed all previous oil plays in the whole West Texas area including the reef play of 1948 and 1949, this deduction being made relative to the number of completed wells from the Spraberry Permian sandstone and the number of active drilling wells projected to the Spraberry sandstone.

As of June 25, 1951, there were 298 producing and 158 drilling wells in 20 different Spraberry sandstone fields, with 11 indicated wildcat discovery wells, which does not include active wildcats which will seek production from the Spraberry Permian sandstone. This compares to February 19, 1951, at which time there were 108 producing and 79 drilling wells in 11 proven fields, with 6 indicated wildcat discovery wells.

As indicated on the Spraberry structure map the Spraberry trend has an areal extent of 128 miles north to south and ranging in width 40 to 50 miles with proven production extending from extreme northern Dawson County at Smith Spraberry field, southward to Flat Rock Spraberry

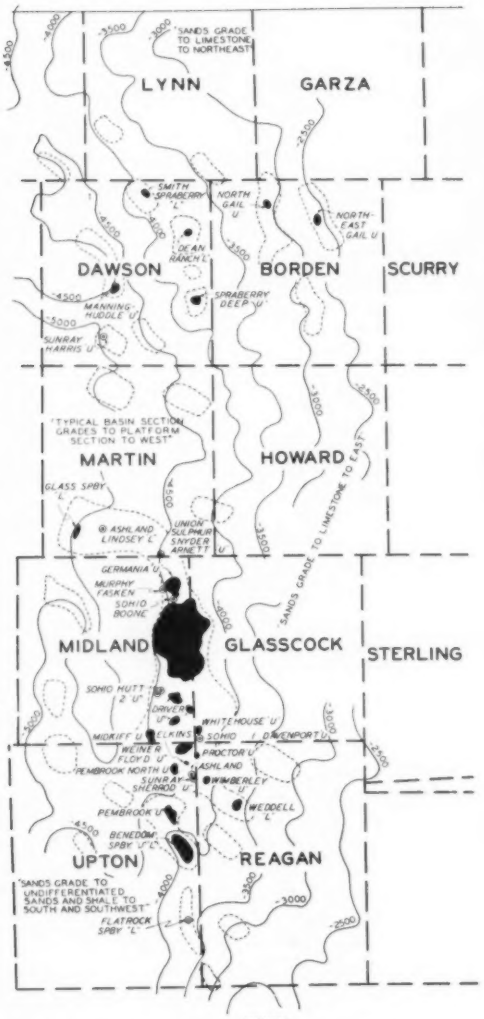


Fig. 1—(Above) Structure map, contoured on top of the Spraberry sandstone, showing active and developed areas, indicated discoveries, and prospective trends.

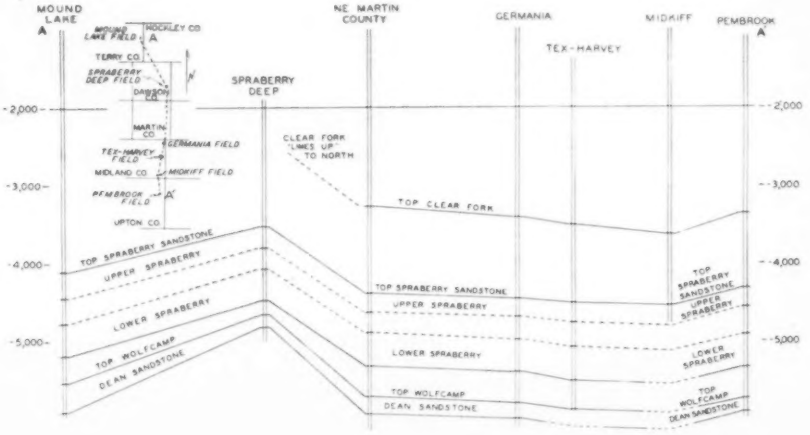


Fig. 2—(Right) Schematic cross-section from north to south through a large portion of the Spraberry trend. Characteristics of electric logs, on which this section is based, begin to change toward the north end of the section.

field in Upton County and extending through eight counties as shown.

It has been estimated that development will require some 5 years from even date to prove and classify the existing areas of Spraberry production throughout what is known as the Spraberry trend. The majority of this current development relative to active rigs is occurring in Midland County; however, additional daily discoveries occurring in northeastern Upton and northwestern Reagan counties indicate additional activity in these areas, not to mention brisk activity which is occurring in all the other counties.

Geologic Section

The Spraberry sandstones of the West Texas area are developed in the lower Leonard section of the Permian series and are generally restricted in areal extent to the Midland basin province of the Permian basin. See accompanying Spraberry structure map (Fig. 1).

The Spraberry section is usually 1,000 ft. thick over most of the area indicated. The upper section ranges from 200 to 250 ft. thick and contains three well-developed and well-correlated sandstone members with intervening black shale and argillaceous limestone.

The middle Spraberry section is composed primarily of black shale with sandstone and/or limestone developed in the central portion, this development usually not being more than 40 to 50 ft. thick. The total thickness of the middle Spraberry section varies from 300 to 350 ft.

The lower Spraberry is similar in composition to that of the upper Spraberry. However, this lower section usually contains four well-developed sandstone members which are generally correlative throughout the Midland basin area relative to the Spraberry trend.

The Spraberry sandstone is a very tight low-permeability, low-porosity-type sandstone which, generally speaking, is highly calcareous and somewhat silty in nature. In most of the producing areas it is highly fractured, relative to major fracturing which occurs in the shale and argillaceous limestone intervening members of the Spraberry sandstone section.

Fig. 2 shows a north-south cross-section through the Spraberry trend of the Midland basin, covering an areal distance of 126 miles and extending from the Mound Lake Pennsylvanian "reef" limestone producing area in central-eastern Terry County to Pembrook field in northeastern Upton County. It indicates the relative position and correlation of the sandstone sections of the Spraberry. It should be noted that the Clearfork section "limes up" to the north making correlations of that section rather difficult in the north area.

From north to south, all of the members of the upper, middle, and lower Spraberry section are definitely correlative with each sandstone member retaining its proper place in the section. However, a detailed study of the Spraberry section from east to west, that is, going regionally downdip to the west towards the trough of the Midland basin, the Spraberry section tends to "shale up" or grade laterally to undifferentiated sandstones and shales in this westward direction.

Eastward across the Spraberry trend to the east extremities of the present known limits of the sandstone developed section of the Spraberry, the sandstone members tend to become much more highly calcareous, but still retain a silty type of composition throughou . In the extreme eastern limit of the Spraberry section there is a lateral gradation into a 100 per cent lime section.

Apparently the Spraberry section and the underlying Dean sandstone section, which is near the basal portion of the Permian, were deposited on a monoclinal, westward-dipping broad shelf area. Eubsequent deposition in middle and upper Permian in association with probable compaction accompanied the gradual sinking of this broad regional area adjacent to the West Texas Permian basin. Later, vertical fracturing occurred and developed extensively throughout this Spraberry section, comprising the previously mentioned thickness of this section.

Figs. 3, 4, and 5—Typical logs of the Spraberry sandstone, showing the separate sandstone members of both the upper and lower Spraberry sandstones. These logs are typical of those in the most active areas of Spraberry development.

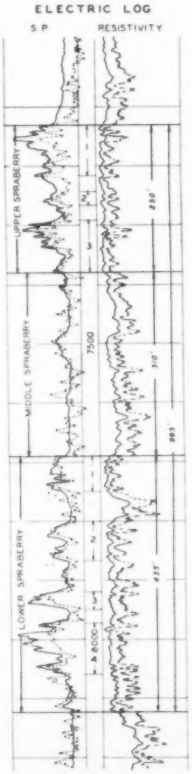
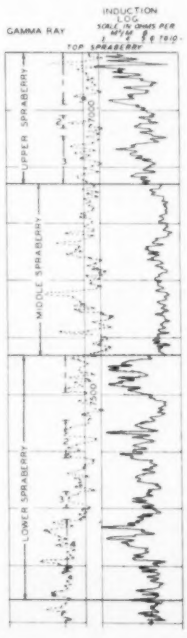
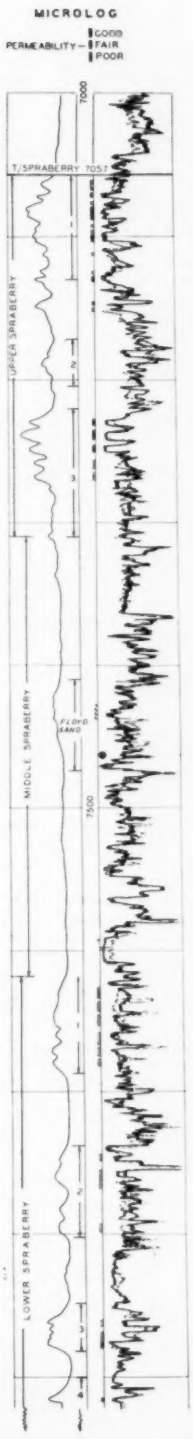


Fig. 3 (left) is an electric log. Fig. 4 (center) is an induction log, and Fig. 5 (right) is a Micro-Log.





THE AUTHOR

J. H. Bartley is a consulting geologist in Midland, Tex., and has been closely associated with development in the Spraberry play since its beginning. He received his B.S. degree from University of Texas in 1937 and has nearly completed work on an M.A. degree from that institution. He joined University Lands in Midland in 1938, and remained there, except for service in the Armed Forces, until September 1, 1950, when he began consulting work.

Apparently the Spraberry section and the underlying Dean sandstone section, which is near the basal portion of the Permian, were deposited on a monoclinal, westward-dipping broad shelf area. Subsequent deposition in middle and upper Permian in association with probable compaction accompanied the gradual sinking of this broad regional area adjacent to the West Texas Permian basin. Later, vertical fracturing occurred and developed extensively throughout this Spraberry section, comprising the previously mentioned thickness of this section.

To date no displacement has been found relative to the position of the sea datum on top of Spraberry sandstone members—intense vertical fracturing occurring which apparently was associated with compaction and down warping throughout this area.

Observation of cores from both the upper and lower Spraberry section show very conclusively that the majority of the fracturing occurs in and is generally restricted to the shale and argillaceous limestone intervening beds throughout the Spraberry sandstone section. It is apparent that these dense zones of shale and argillaceous limestone, being more resistant beds than the intervening sandstone members, give way to a vertical-type fracturing. The major fracturing in many cases extends into the intervening sandstone members, it being visibly apparent that these fractures die out into the sandstone members.

Development

The Spraberry was first recognized in the Seaboard Oil Co. 1 A. J. Spraberry, a wildcat well located in the currently producing Spraberry and Spraberry Deep field in east-central Dawson County. This well was drilled to the base of the Spraberry and was abandoned after testing 1,000 ft., total open-hole section, which was acidized but did not prove commercially productive at that time. The complete Spraberry section in this well was cored extensively.

Subsequent to the drilling of this test well, the Seaboard 6-A Robison, also located in Spraberry Deep field, cored the complete Spraberry section and was drilled to the Ellenburger, being plugged back for the testing of the Pennsylvanian reef section. This well had pipe cemented through the Spraberry section which prohibited successful testing of same, and was abandoned.

The discovery well of Spraberry Deep field, which was also the first Spraberry producer in West Texas was Seaboard 2-B Lee which was completed January 22, 1949, for a potential of 319 bbl. of oil per day after being shot with nitroglycerin. Approximately 1 month later Tex Harvey field in eastern Midland County was discovered by Tex Harvey 1 Floyd. Subsequent to these two major discoveries wildcatting in the Spraberry trend did not become active until the opening of the year 1950, during which year six Spraberry discoveries were made, namely: Pembrook, Germania, Benedum - Spraberry, Midkiff, Manning Huddle, and Smith-Spraberry fields.

The name Spraberry sand has been used extensively throughout the Midland basin area, but it was not until January 30, 1951, that it was formally named. A paper entitled "The Spraberry and Dean Sandstones of West Texas," by Lamar McLennan, Jr., of Seaboard, and Waring Bradley, of the Permian Basin Sample Laboratory, both of Midland, was submitted on January 30, 1951, to the American Association of Petroleum Geologists for publication and formal recognition of the Spraberry and Dean sandstones of West Texas.

In addition to naming the Spraberry and Dean sandstones this paper discusses correlation and age of the Spraberry and the Dean sandstones and their regional relationships throughout the Midland basin.

Structure

In all cases, with two exceptions, the accumulation of oil in the Spraberry sandstone is associated with broad regional west-plugging monoclinal nosing, showing maximum closure on these noses of some 30 ft. The exceptions occur in Spraberry Deep field which is a closed anticlinal-type structure with approximately 300 ft. of relief. The presence of this structure in the Spraberry section is primarily due to the "reef" buildup in the Pennsylvanian limestone beneath. The second exception is Benedum-Spraberry field of Upton County which shows a maximum of 195 ft. of closure in the Spraberry section that is directly related to the prominent deep-seated faulted Ellenburger structure. This structure was originally known as Benedum field, and is currently producing from the Ellenburger, Fusselman, Pennsylvanian, and the Spraberry sandstone section.

Relative to these two exceptions, in Spraberry Deep field of Dawson County, the Spraberry section exhibits very little vertical fracturing to the extent that completions necessitate the use of nitroglycerin shots to increase the permeability, whereas in Benedum-Spraberry field vertical fracturing is very prominent in the Spraberry sandstone section.

Accumulation of Oil

Two general types of traps are in evidence throughout the Spraberry trend and additional types may become apparent with development of new producing areas. One is the anticlinal type having apparent established water tables. The other type is the monoclinal nose with permeability pinchout due to lateral gradation of the sandstone section updip or downdip, in either the upper Spraberry or the lower Spraberry sandstone.

With regard to known producing areas, the upper Spraberry sandstone is best developed in areal extent from southern Martin County to east-central Upton County. The upper Spraberry is best developed areally in a band ranging from a subsea datum of —4,175 to —4,500 ft. throughout this area. Downdip regionally to the west from this band the upper Spraberry section tends to grade laterally into undifferentiated sandstone and shales, and does not indicate possibilities for accumulation of oil. Updip to the east of this band the upper Spraberry sandstone section becomes much more highly calcareous until it grades into a highly sandy limestone with lesser probabilities of oil accumulation.

Likewise the lower Spraberry is best developed in the same general area as is the upper Spraberry sandstone section. However, westward and downdip below a datum of —4,500 ft. on top of the Spraberry sandstone, the lower Spraberry does not tend to grade laterally to undifferentiated sandstone and shale and the individual sandstone members do not lose any of their characteristics until a datum of —5,100 ft. is reached. Due to this condition accumulation in the lower Spraberry has been indicated and will probably occur in other areas within this band below —4,500 ft. subcorrelation of the individual sandstone.

To the east and regionally updip of the aforementioned band of production of the upper Spraberry sandstone, the lower Spraberry has better producing possibilities. The lower Spraberry sandstone section is the last in the section to grade into limestone to the east. There is an indication that eastward of the —4,150-ft. subsea datum on top of the Spraberry sandstone, accumulation should most likely be anticipated in the lower Spraberry sandstone section where the Permian is directly related to a pre-Permian positive structural area.

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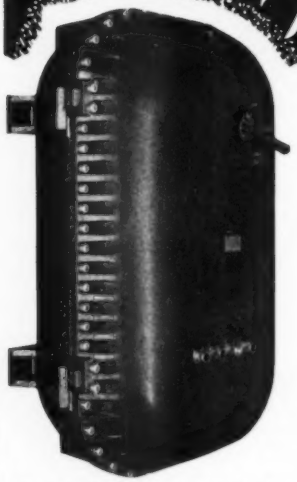

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TABLE 1—SPRABERRY PRODUCING AREAS OF WEST TEXAS

County, field, discovery well and discovery date—6-25-51	Prod. wells	Avg. allow. B/D	Pot. range B/D	Avg. grav. °A.P.I.	Avg. elev. (ft.)	Avg. TD (ft.)	Spraberry prod. section (U)	(L)	(U-L)	Method of completion Hydf.	Shot	Acid	Active rigs
Borden:													
North Gail, Hunt 1 Clayton & Johnson (3-29-49)	1	15	40	41	2,625	5,775	1					1	
Northeast Gail,† Stanolind 1 Miller (6-25-51)	1	120	121	38	2,515	5,535	1			1			
Dawson:													
Manning-Huddle, Manning 1 Huddle (10-17-50)	1	120	186	38	2,970	8,026	1				1		
Smith-Spraberry, Std. of Tex. 1 Smith (12-1-50)	1	73	73	37	3,080	7,983		1			1		2
Spraberry Deep, Seaboard 2-D Lee (1-22-49)	35	137	160-780	39	2,900	6,750	35				35		2
Dean Ranch,† Snowden 1-30 Dean (5-3-51)	2	135	150	39	2,845	7,300		2			2		1
Indicated disc., Sunray 1 Harris			D.S.T.-oil		2,955	8,135	*1						
Glasscock:													
Whitehouse,† El Capitan 1 Whitehouse (6-11-51)	1	160	322	37	2,731	7,028	1			1			12
Indicated disc., Sohio 1-A Davenport			Oil in hole		2,720	6,922	*1						
Martin:													
Glass Spraberry, Gulf 1-E-B Glass (2-17-51)	1	66	100	38	2,880	8,800		1		1			1
Indicated disc., Union Sulphur 1 Snyder et al			Pmp. oil		2,680	7,250	*1			*1			
Indicated disc., Ashland 1 Lindsay			Swb. oil		2,790	8,590		*1		*1			
Midland:													
Driver, Weiner 1-16 Driver (1-26-51)	10	160	173-304	38	2,720	7,325	10			10			17
Germania, Snowden 1-7 A. Fasken (3-2-50)	28	100	69-397	38	2,675	7,250	28			20	8		8
Midkiff, Humble 1 Midkiff (10-9-50)	5	110	84-283	36	2,770	7,430	5			5			9
Midland-Glasscock:													
Tex Harvey, Tex Harvey 1 Floyd (2-24-49)	174	121	27-805	39	2,600	7,350	154	6	14	126	46	2	74
Midland:													
Indicated disc., C. H. Murphy 1 Fasken			Swb. oil		2,665	8,105		*1		*1			
Indicated disc., Sohio 1 Boone est.			Oil in hole		2,635	7,140	*1						
Indicated disc., Sohio 1-A Hutt et al			Oil in hole		2,725	7,325	*1						
Indicated disc., Sohio 1-B Hutt et al			Oil in hole		2,730	7,315	*1						
Reagan:													
Weddell Spraberry, Blackwood & Nichols 1 Weddell (5-24-51)	1	120	209	41	2,655	7,145		1		1			2
Wimberly,† Barnhart 1 Wimberly (6-21-51)	1	120	176	38	2,695	6,900	1			1			
Proctor,† Texas Crude 1-40 Proctor (5-24-51)	1	120	70	37	2,715	7,130	1			1			4
Indicated disc., Sunray 1-A Sharrod			Flw. oil		2,700	7,015	*1				*1		
Upton:													
Benedum Spraberry, Rep. Nat. Gas 2-B Barnett (4-3-50)	10	80	30-220	40	2,690	7,550	3	7		4	6		1
Elkins,† Ashland 1-42 Elkins (6-6-51)	1	120	229	37		7,115	1			1			4
Pembrook, Humble 1 Pembrook (1-8-50)	18	101	34-304	39	2,715	7,140	18			2	15	1	9
Pembrook, N., Barnhart 1 Tippett (5-14-51)	1	160	343	38	2,740	7,235	1			1			4
Weiner-Floyd, Weiner 1 Braden (2-13-51)	5	160	452	39	2,715	7,175	5			5	*1		8
Indicated disc., Ashland 1 Sherrod			Pmp. oil		2,715	7,180	*1			*1			
Indicated disc., Humble 1 Tippett			Flw. oil		2,770	8,641		*1					
Flatrock Spraberry (ind. disc.), Cit. Service et al 1-AH University			Flw. D.S.T.		2,750	7,200		*1					
Totals—20 producers; 12 indicated discoveries.	298						266	18	14	180	114	4	158

*Indicated discovery, not included in totals. †Tentative name.

northward through Dawson County and into extreme southeastern Terry County the Spraberry sandstone indicates better possibilities for accumulation in the lower Spraberry than in the upper Spraberry. However, in Smith-Spraberry field and in the Manning Huddle producing areas, the producing section of the Spraberry is occurring in the lowermost sandstone member of the upper Spraberry, whereas in Spraberry Deep field in eastern Dawson County most of the accumulation occurs in the upper Spraberry. There are definite indications, however, of production in the lower Spraberry.

To the northeast of this area, in the Snowden Dean area, the lower Spraberry has the better developed section and productive possibilities. Further eastward into Borden County the upper Spraberry is the better developed. Structurally all of the areas from northern Martin County northward to and including the previously discussed areas seem to be directly associated with pre-Permian structural development whether it be Pennsylvanian reef buildup or primary development subsequent to Ellenburger structural development.

Producing Zones

Fig. 3 is a detailed Schlumberger section log representative of the Spraberry section as found throughout the Spraberry trend relative to a subsea datum of approximately —4,400 ft. As shown on Fig. 3 the upper Spraberry represented thereon is 250 ft. thick gross, exhibiting an average 90 ft. net development of sand.

A resume of Fig. 1 and Table 1 shows that the major Spraberry producing developed areas primarily obtain their production from this upper section of the Spraberry sandstone. The No. 1 sand is the better developed of the three sandstone members of this section with a majority of the wells in the area producing from the upper Spraberry, being completed with an average maximum penetration of 120 ft. of the upper Spraberry which includes the Nos. 1 and 2 sands.

The lower Spraberry section which ranges from 430 to 490 ft. thick gross and exhibits 160 to 185 ft. of net sand development is apparently as well developed as the upper Spraberry. Present development, however, has been such that it is more economical to complete wells in the upper Spraberry than to penetrate to the lower Spraberry, which would call for an additional 700-900 ft. of hole to be cut. However, it should be noted that in the areas that produce only from the lower Spraberry, the upper Spraberry is not developed sufficiently for accumulation in that section. Production statistics to date indicate that the lower Spraberry is not as productive as is the upper Spraberry.

Of the four sandstone members of the lower Spraberry the lowermost sand, No. 4 sand, is the best developed productively of all of the sand members of that section. It should be pointed out that a study of Micro-Logs of the Spraberry indicates that the No. 1 sand of the lower Spraberry should be the better developed, but productively this has not been found to be the case. This apparently is explained by the lack of fracturing occurring adjacent to and in this sandstone member of the lower Spraberry section.

Water Tables

None of the currently developed producing areas exhibits a clean-cut water-table datum. In Spraberry Deep field water is encountered in edge wells with each sandstone member carrying water in relation to the developed permeability of each sand. The sands carrying high permeability are most likely to produce water. In all of the other Spraberry producing areas there is no established water-table datum.

The appearance of water in each sandstone member of both upper and lower Spraberry in known producing areas will increase in amount

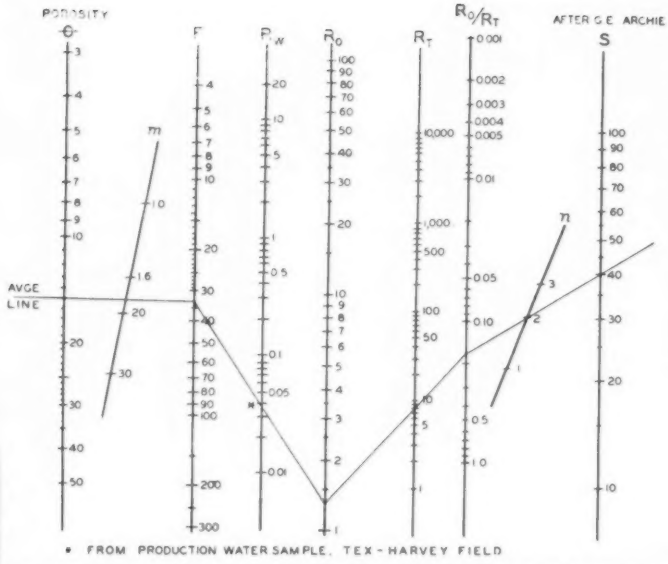


Fig. 6—Nomographic chart for use in determining water saturation. Symbols are: P, per cent porosity; m, cementation factor; F, formation factor; R_w, resistivity of formation water at reservoir temperature; R_o, resistivity of formation when 100 per cent water bearing; R_T, true resistivity of formation; n, root value used to determine water saturation; S, fraction of voids filled with formation water. Line indicates average Spraberry conditions.

progressively downdip, being an edge-type water. Generally speaking, the upper Spraberry sandstone producing limits range downdip to a subsea datum of average —4,550 ft. on top of the Spraberry sandstone at which datum the upper Spraberry sandstone section becomes saturated with water and is not commercially productive. The presence or the location of edge-water relative to the lower Spraberry has not been determined to date.

In developed producing areas, varying percentages of as high as 5 per cent of water are produced from normal completions, it being assumed that this water is connate. Due to the presence of abnormally low permeability and evidence indicating that all of the Spraberry reservoirs are low-pressure-type reservoirs it becomes more apparent as production history accumulates that water drive in the Spraberry sandstone section is not effective as a reservoir energy. Present reservoir data indicate that all of the Spraberry sandstone producing areas will be depletion-type reservoirs and that the degree of fracturing will determine the capacity of such reservoirs.

Logging Practices

There are two methods generally used to drill the Spraberry pay whenever it is the terminal horizon. The one ordinarily used in Tex Harvey field consists of drilling to near the top of the sand with mud, then setting pipe, and drilling into the pay with oil, preferably Spraberry oil. The other method consists of drilling with oil emulsion below the salt string, usually set between 3,000 and 4,000 ft. below the surface, and on through the pay. This method is usually used in Spraberry field. Some operators drill the pay with straight water-base mud, but they are in the minority.

Of course when horizons below the Spraberry are explored, the Spraberry section usually is drilled with regular mud. Operators usually prefer to use a low-water-loss oil-emulsion mud or oil for drilling the Spraberry to prevent water block in the productive zone. As these practices prevail, from a logging standpoint, the wells fall into two classes: those drilled with oil, and those drilled with oil-emulsion or other specially treated water-base muds. As oil is a nonconductor wells drilled with oil cannot be surveyed with conventional electrical-logging equipment that depends on the mud for electrical contact with the formations.

Fortunately a special type of electrical-logging equipment has been devised which operates on high-frequency currents that can be projected into the formations like radio signals and do not depend on the mud for transmission. This device produces a regular resistivity curve calibrated in ohm-meters and is known as the induction log. This equipment was developed by Schlumberger Well Surveying Corp.

Although the curve is calibrated in the same resistivity units as the conventional electrical log, the resistivity scale is approximately logarithmic so that high ohm values are compressed while the low ohm values are very much amplified. This scale arrangement is particularly suited for accurate logging of low ohm values and allows a log very useful in determining water-bearing zones which in the Spraberry have low resistivity.

A gamma-ray curve is used to locate the sand bodies and the induction log is used to determine the water-bearing zones and to get an idea of the saturation and porosity. Note the clear and positive definition of the water-bearing zone at 6,927 ft. on the induction log in Fig. 4. This combination of gamma-ray and induction log has been used on almost all Spraberry wells that have been drilled with oil since 1949, finding its first application during the discovery of Tex Harvey field. It is now accepted as the standard Spraberry oil-mud log.

Spraberry wells drilled with oil emulsion or specially treated water-base muds can be logged with conventional electrical logging equipment and offer no special problems. Usually the water-base mud logs consist of an electrical log and a MicroLog. (See Fig. 5.) In view of the excellent qualities of the induction log for locating water-bearing zones some operators also run this log in addition to the other two mentioned above. Note that the MicroLog is normal in appearance, showing low readings opposite sand bodies permeable enough to allow formation of a mud cake.

A nomographic chart is shown in Fig. 6 and a line has been drawn across this chart to represent the average characteristics of a Spraberry oil sand. Naturally this average characteristic will not apply in every case, but is the average condition found after a study of many productive zones of the Spraberry sandstone section. The chart is shown as it may be of interest to petrophysicists or others who make a study of log analysis.

Some general conclusions have been drawn about the characteristics of the Spraberry sand and are noted below:

1. Sands have various degrees of cementation, and are often shaly or silty. Clean sands are the exception instead of the rule.

2. Whenever the induction log yields a resistivity of less than 2.5 ohm-meters, the sand is nearly always water bearing. However, in a few cases the sand is so tight that no water is produced.

3. Whenever the induction log yields a reading of 40 ohm-meters opposite a sand showing low radioactivity (gamma ray gives a large kick to the left of the log) probably the sand is limy and hard with a chance there is low oil saturation.

4. The upper limit of water saturation for oil production is estimated to be around 60 per cent. So far it appears that water saturation in the

best oil sands will not be less than about 20 per cent.

5. Experience has indicated that porosities found in productive oil-bearing sands will usually range from 10 to 20 per cent.

6. Evidence from cores in widely separated Spraberry wells indicates extensive vertical fracturing of the Spraberry reservoir. Horizontal fracturing may also be present but it would not be as obvious as the vertical fracturing and so has not been remarked upon generally.

The effect of vertical fracturing can be illustrated by the experience of one operator who set pipe in the top of the Spraberry and then cored ahead. Cement was present in vertical fractures of the cores as far as 92 ft. below the total depth when coring began. Fracturing will have an important effect on drainage of the formation and ultimate recovery.

7. As far as is now known there is no effective water drive in the Spraberry nor is any likely to be found in view of the low permeability. Spraberry reservoirs are generally conceded to be of the simple depletion type depending on gas expansion for oil recovery.

Drilling and Completion Practices

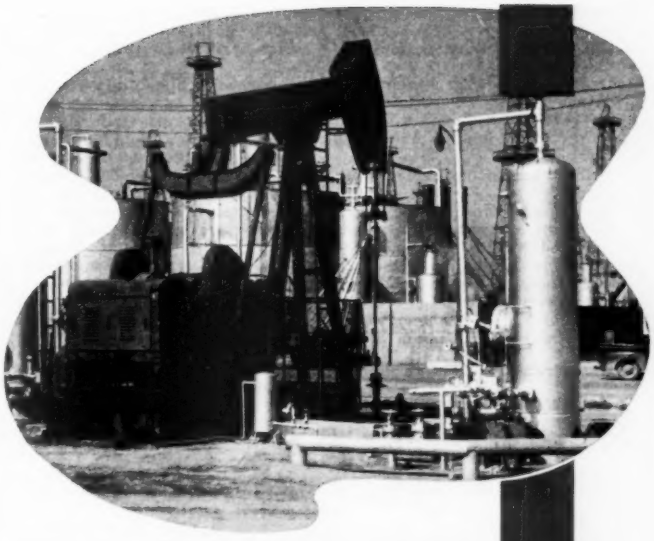
The casing programs used throughout the Spraberry trend are generally of two types, primarily controlled by company policies and pipe available to the individual operator. One type of casing program is to set 200 to 400 ft. of surface pipe, 3,600 to 3,900 ft. of intermediate casing to the top of the Grayburg (Permian) limestone, and to run the oil string as a liner between the intermediate string and the top of the Spraberry sandstone.

The other type of casing program is to set a short surface string, and then run one long producing string of pipe that is cemented from the surface to total cased depth. The use of the second type of casing program involves a certain amount of risk for the operator or contractor due to the fact that caving and considerable loss of circulation is no uncommon in penetrating to the casing seat near to the top of the Spraberry sandstone. It is necessary in all of the operations using this type of casing program to drill with mud most of the way.

Approximately 10 per cent of the completed wells in the Spraberry trend have been completed through pipe perforations. This completion procedure is less successful compared to completion through open-hole section. Experience has shown that use of a very low water loss mud (5 per cent and preferably less) in the drilling of the shale section above the Spraberry sandstone is definitely preferable.

The various types of completion procedures in use include:

1. Drilling the pay section with regular drilling mud, oil or emul-



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sion mud, or Spraberry oil prior to setting pipe.

2. Completion through perforations or from open hole.

3. Drilling in the pay section with conventional rotary tools using oil with a reverse head or drilling in with a reverse-circulation unit using Spraberry oil.

4. Drilling in the pay section with cable tools.

Of these procedures, it is apparent that the most efficient and economical preferred method is to set pipe approximately 50 ft. above the top of the Spraberry sandstone, and then move in a reverse-circulation drilling-in unit to drill the remainder of the hole, penetrating a maximum of 100 ft. below the top of the Spraberry sandstone, and following this procedure with an injection of Hydrafrac.

For final completion of wells from the Spraberry sandstone (relative to use of acid, nitroglycerin, Hydrafrac, or Moflo) it has been found by experience that the best method is the use of Hydrafrac (see Table 1—Method of Completion) injections of fluid under pressure into permeable and fractured zones to increase permeability. Usually Hydrafrac is applied to the Spraberry sandstone section with a packer set near the base of the black shale section and immediately above the top of the Spraberry sandstone.

A correlation of the productivity of numerous wells throughout Tex Harvey, Germania, and Pembrook fields has shown that the potential capacities of wells is definitely not related in direct ratio to the amount or thickness of Spraberry section penetrated.

For instance it has been found that wells that have been completed from the No. 1 sand of the upper Spraberry sandstone section have a higher potential than wells that penetrate the complete upper Spraberry sandstone section some 230 to 250 ft. thick. A probable explanation for this is that each sandstone member is an individual reservoir. However, there are apparently definite connections between these sand bodies by way of vertical fracturing which is very prominent in the intervening shale and argillaceous limestone sections. This would indicate that there is a possibility of very small variation of pressure in each of the sands.

It should be pointed out that the shale and argillaceous limestone section immediately overlying the top of the Spraberry sandstone section is usually highly fractured, sometimes as much as is the Spraberry sandstone and intervening shale sections below. This makes it necessary to penetrate the last 200 ft. of shale section immediately overlying the Spraberry sandstone with caution in the use of lost-circulation materials, reduction of pump pressures, and so forth, so that fluids will not penetrate these vertical fractures and plug the fractured zones in the pay section.

As previously mentioned cement has been found in vertical fractures as far as 90 ft. below the total depth at time of setting the oil string. In nearly all cases when cable tools are used after pipe is set above the top of the Spraberry and the cement plug drilled, free oil appears as soon as new hole is made. This occurs even though the total depth at that point might be 40 to 50 ft. above the top of the Spraberry sandstone. This oil comes into the well bore through vertical fractures which persist above the top of the Spraberry sandstone.

Drilling time plotted precisely on log strips and correlated with Schlumberger electric logs of nearby wells makes it possible to determine the proper casing seat for the oil string so that penetration of the black shale section near the top of the Spraberry sandstone will not be excessive. Most operators determine a casing seat and then run an electric log to verify the casing seat relative to the top of the Spraberry sandstone so it is not necessary to drill into and locate the top of the sand prior to running pipe.

Geologically there are no bona fide markers for this casing seat. However, the lower black shale section does become more calcareous toward the base indicating nearness to the top of the Spraberry sandstone. Experi-

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ence has definitely shown, though, that a predetermined casing seat can be found within an accuracy of 5 to 10 ft. relative to a desired interval above the top of the Spraberry sandstone by use of drilling time curves as mentioned above.

Recoveries

The presence of major vertical fractures throughout the Spraberry sandstone section has added tremendously to the calculations for future recoveries of oil from the Spraberry sandstone. Some of these fractures range to a maximum width of ½ in., the width of the fracture being measurable due to the presence of cement in the fracture. As mentioned, the cement was present because the oil string was cemented relatively close to or in the top of the Spraberry sandstone. Under high pressure the cement was forced down these vertical fractures to as far as 90 ft. below the top of the Spraberry sandstone.

It is generally known that core data from the Spraberry sandstone section from various areas throughout the Spraberry trend are very similar with regard to factual data, figures, and recovery-per-acre calculations. Not considering the fractures, the Spraberry sandstone exhibits permeabilities ranging from 0.1 to 2 md. with porosities ranging from 4 to 15 per cent. For the upper Spraberry calculated recoverable oil from core analyses ranges from 30 to 55 bbl. per acre-foot. Based on a net thickness of 90 ft. of sandstone development in this upper Spraberry section, this would indicate recoverable oil in place ranging from 2,700 to 4,950 bbl. per acre. Reservoir data in most of the older Spraberry producing areas indicate a depletion-type reservoir with very little apparent effective water drive.

In the lower Spraberry sandstone which has a net development of approximately 170 ft. and from which a very meager amount of core data is available, a conservative estimate of 30 bbl. of recoverable oil per acre-foot would indicate 5,100 bbl. of oil per acre. This zone would be productive through most of the Spraberry trend.

In the light of current core data with due regard to the major vertical fracturing present throughout the Spraberry sandstone section it is necessary to materially raise the above estimates of recoverable oil. These vertical fractures add immensely to the permeability of the Spraberry sandstone and increase the amount of open reservoir space. Communication with engineers in the West Texas area tends to elevate estimates of recoveries from the upper Spraberry due to the presence of vertical fracturing to as high as 10,000 bbl. of oil per acre.

The Spraberry structure map, Fig. 1, shows areas of prospective Spraberry production and probable trends. The designation of these prospective areas is based on studies of subsurface conditions as exist in the Spraberry section, both upper and lower. These studies consider Spraberry structure and its relationship to pre-Permian structurally developed areas and low relief areas throughout the Midland basin, there being a definite relationship of these prospective trends to low-relief pre-Permian developed areas.

Fig. 1 also indicates the limits of the Spraberry sands for the reason that the sands grade to limestone to the northeast and east and grade to undifferentiated sand and shale to the south, southwest and somewhat to the west. They grade to a typical basin section toward the Central Basin platform to the west.

BOOKS

OIL & GAS DIRECTORY—TEXAS, LOUISIANA, OKLAHOMA, NEW MEXICO. Published by Oil and Gas Directory, Inc., 504 Richmond, Houston. 410 pp. $18 per issue annually.

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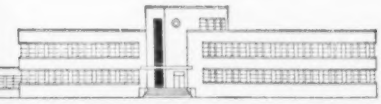

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CORROSION and its control

Corrosion Instruments

(2) COMBINATIONS

SINCE most of the potential measurements which must be taken in the course of corrosion investigations involve very low voltages and external circuits of high and unknown resistance, it is imperative that the potential measuring instrument used be one which does not draw current from the circuit under test. The potentiometer, already described, is one solution to this problem. Another is the instrument known as the potentiometer-voltmeter; like the potentiometer, it balances the external voltage against one generated within the instrument, using a galvanometer to indicate balance; but instead of determining the internal voltage by geometric subdivision of a standard potential along a slide wire, the combination instrument uses an internal voltmeter to measure it directly. The basic circuit of the potentiometer-voltmeter is shown in Fig. 1. When the galvanometer reading is zero, the voltmeter reading correctly reflects the potential across the terminals of the instrument.

Several modifications are necessary in order to convert this simple circuit into a workable instrument: the galvanometer must be protected from excessive current which might burn it out, by the introduction of a current-limiting resistor, a push-button switch may partly bypass this resistor for greater sensitivity when an approximate balance has been reached. A switch must be provided in the battery circuit to limit its current drain to the time the instrument is in use. Two rheostats instead of one can be added, to provide both a coarse and a fine adjustment. An additional voltage scale may be provided by the use of a series resistor. These modifications will result in the instrument shown in Fig. 2.

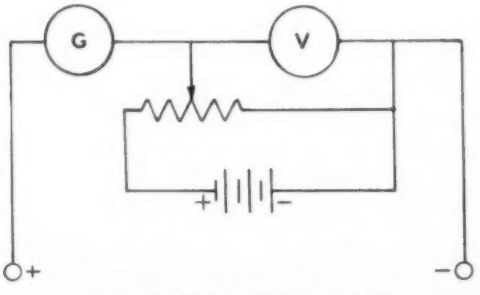

Fig. 1—Basic potentiometer-voltmeter circuit.

Either the galvanometer or the voltmeter used in such an instrument may be so chosen that it will also serve, with suitable shunts, as an ammeter; the shunts can then be built into the instrument, together with proper switching arrangements. Dotted portion of Fig. 2 represents two ammeter ranges added to the circuit; the switch in the ammeter circuit must be ganged with the one in the battery circuit, so that they cannot both be closed at the same time.

Instruments of the above nature have been built with many more ranges, and more complex switching arrangements, than have been here described; in addition, various other features may be incorporated. One available model, for example, has six potential ranges, from 10 mv. to 2 volts full scale; in addition to this, it may be used as an ordinary voltmeter with nine ranges, from 10 mv. to 100 volts; as an ammeter with seven ranges, from 2 ma. to 20 amp. The two instruments may be used independently at the same time, and numerous special combinations may be set up besides those mentioned.

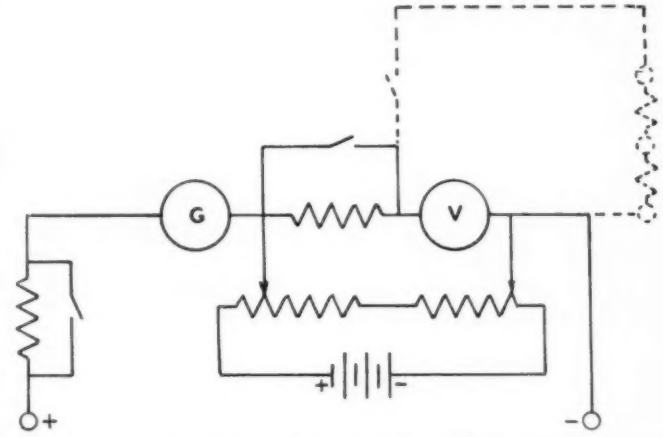

Fig. 2—Basic circuit of Fig. 1 modified to include: (1) coarse and fine voltage adjustment; (2) high and low-voltage scales; (3) protective resistor for galvanometer; and (4) two ammeter scales.

These versatile combination instruments serve well the purposes of those who have to deal with a great variety of problems. If, however, one single type of measurement is to be repeated several hundred times, as in making a pipe-to-soil potential survey, it is a distinct advantage to be able to leave all of the equipment at home except the part needed!

Part 24 of a series by Marshall E. Parker, consulting engineer, Houston.

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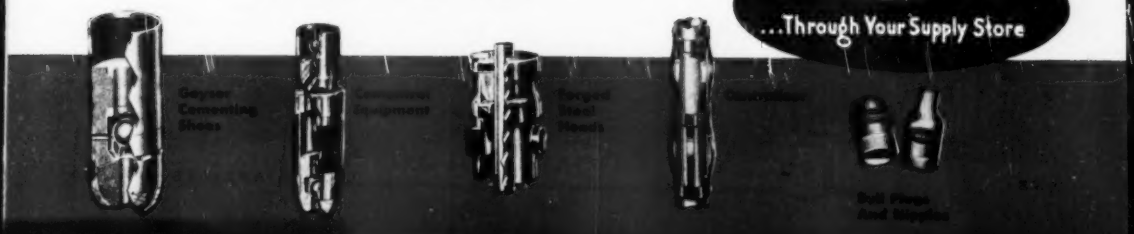


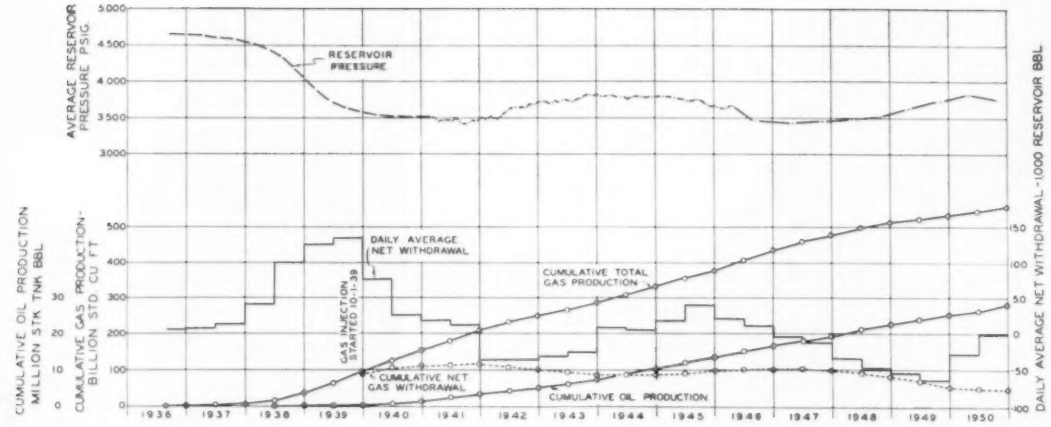
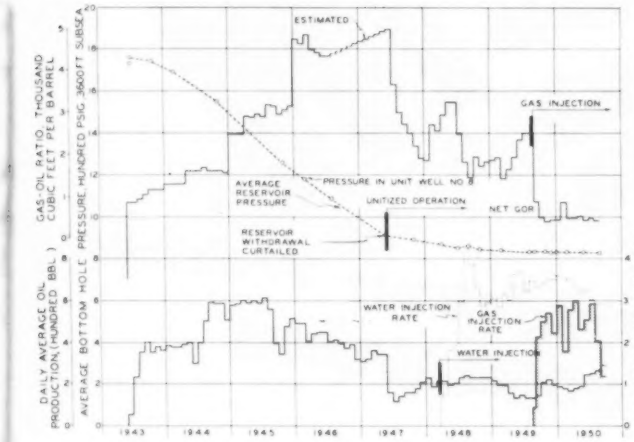

AVERAGE RESERVOIR PRESSURE PSIG
RESERVOIR PRESSURE
CUMULATIVE OIL PRODUCTION MILLION STK TNK BBL
CUMULATIVE GAS PRODUCTION-BILLION STD CU FT
DAILY AVERAGE (NET WITHDRAWAL
GAS INJECTION STARTED 10-1-39
CUMULATIVE TOTAL GAS PRODUCTION
CUMULATIVE NET GAS WITHDRAWAL
CUMULATIVE OIL PRODUCTION
DAILY AVERAGE NET WITHDRAWAL-1000 RESERVOIR BBL
1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950

Fig. 2—(Above) Pressure and production history, Armstrong reservoir, Old Ocean field, Texas.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AVERAGE BOTTOM HOLE PRESSURE, HUNDRED PSIG 3500FT SUBSEA
DAILY AVERAGE OIL PRODUCTION, (HUNDRED BBL.)
WATER INJECTION RATE
GAS INJECTION RATE
WATER INJECTION
DAILY AVERAGE WATER INJECTION RATE, (HUNDRED BBL.)
DAILY AVERAGE GAS INJECTION RATE, (HUNDRED THOUSAND CU FT.)
1943 1944 1945 1946 1947 1948 1949 1950

Fig. 3—(Left) Graphic history, Porter field, Texas, unit.

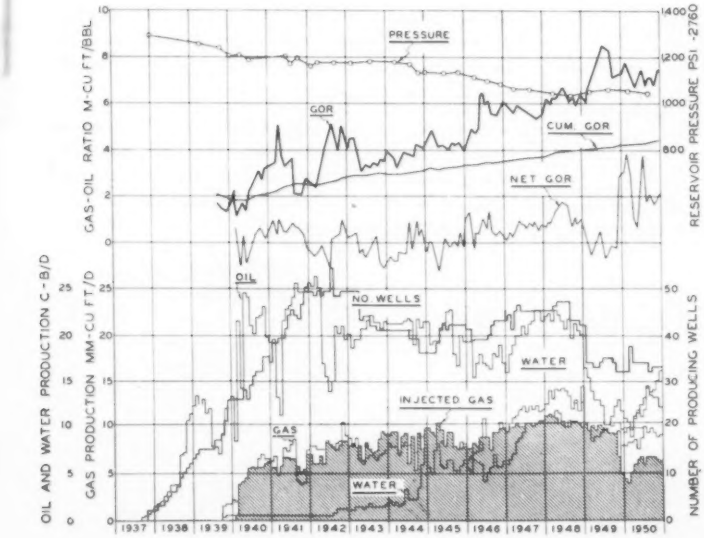


Fig. 4—(Below, left) Reservoir-performance curve, upper sand first Government wells, Driscoll field, Duval County, Texas.

Texas Continues Conservation Progress

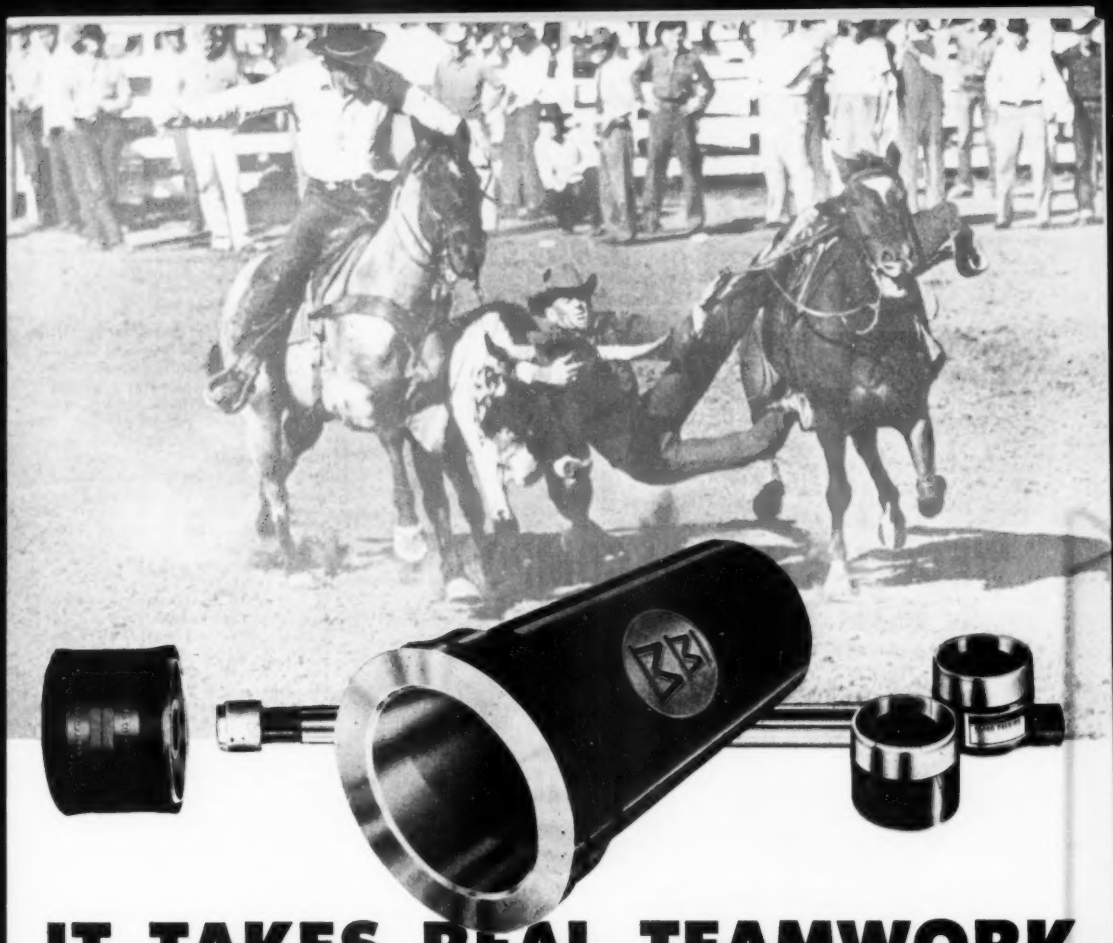
(Continued from page 119)

near water injection wells have had their oil production increased steadily as a result of the water-injection program. Reservoir is completely unitized. All casing-head gas produced is being compressed and injected into the gas cap and water is being injected into the structurally low part of the reservoir.

Pridham Lake.—The original gas-oil contact was at —4,669 ft. and water-oil contact at —4,681 ft. Ratio of original gas cap volume to oil zone volume was 0.416. Gas injection started in December 1948. More gas has been injected since the start of injection than has been produced. Reservoir had some water drive but insufficient to maintain pressure at desired producing rate. Gas injection prevents gas-cap shrinkage. Water production was 56 per cent of liquids in 1950.

Pridham Lake, West.—The original gas-oil contact was —4,672 ft. and water-oil contact at —4,682 ft. Ratio of original gas cap volume to oil zone volume was 0.312. Water production was 80 per cent of liquids in 1950. Gas injection started in December 1948. Vented gas has been small since that time. Gas injection prevents gas-cap shrinkage.

White Creek.—Average production was 2 bbl. per well per day when injection started. Low end of reservoir is approximately 100 ft. below the high end. Gas is purchased from a



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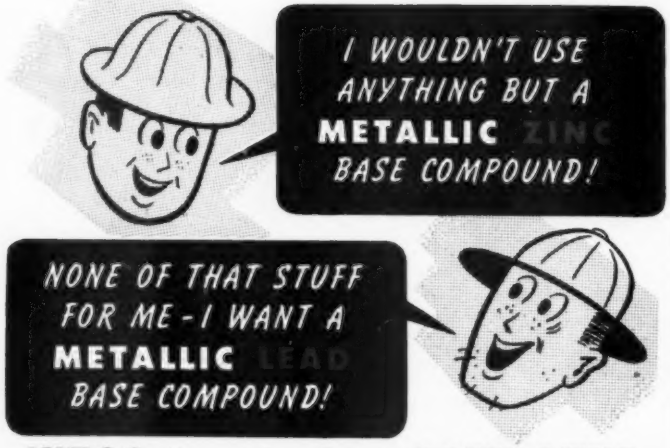

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nonassociated gas sand in Ezzell field. Reservoir had practically no water drive.

Wyrick. — 5,000-ft. sand reservoir; depletion-type reservoir; gas from 3,200-ft. sand cycled through reservoir; gas processed at Stanolind Oil & Gas Co.'s La Rosa plant thence to market. Ultimate recovery increased 20 to 30 per cent by process.

District No. 3

Amelia.—The field is a domal structure lying to the southeast of a northeast-southwest trending fault. There is no faulting within the productive area. In the Frio 6 Langham reservoir the original gas-oil contact was at —6,730 ft. and original oil-water contact at —6,751 ft. Ratio of gas-cap volume to oil-zone volume was 1.5. Approximate dip of producing zone is 70-235 ft. per mile. Reservoir has an excellent water drive. A casing leak was detected in February 1950. Gas-cap shrinkage was halted by gas-injection program.

Esperson Dome. — Middle Yegua reservoir had an original gas-oil contact at 8,100 ft. and water-oil contact at 9,000 ft. Ratio of gas-cap volume to oil-zone volume was 1.0. Dip of producing zone is approximately 30°. All gas is used for lease purposes or pressure-maintenance work. Through December 1950, 335,939 M.c.f. of gas has been injected into this reservoir.

Basal Yegua.—This reservoir had an original gas-oil contact at 8,210 ft. and oil-water contact at 9,100 ft. Ratio of gas-cap volume to oil-zone volume was 1.0. Dip of producing zone is approximately 30°. All gas is used for lease purposes and pressure maintenance. Through December 1950, 837,290 M.c.f. of gas have been returned to the formation. Reservoir has limited water drive.

Esperson Dome, South.—The Crockett sand had no original gas cap and water-oil contact at 7,830 ft. Dip of producing zone is approximately 37.5°. Through December 1950, 938,671 M.c.f. of gas was injected. The reservoir has a limited water drive.

Fairbanks. — The reservoir had an original gas-oil contact at —6,707 ft. and water-oil contact at —6,740 ft. Ratio of gas-cap volume to oil-zone volume was 1.144. Water production is 42.6 per cent of liquids. Ten million cubic feet of gas per day is injected into reservoir. Allowables have been reduced to 25 bbl. per day for a well on 10 acres, but the reservoir pressure continues to decline. The reservoir would probably perform better if drilled to a lesser density.

Joe's Lake.—Water is obtained from the Cockfield at about 5,000 ft. and injected into the first and second sands. The combined production of two sands before water flooding was 325 bbl. per day. After flooding, production increased to an average of 1,100 bbl. per day. All produced gas is returned to the three producing sands.

Kirby.—An analysis of geologic con-

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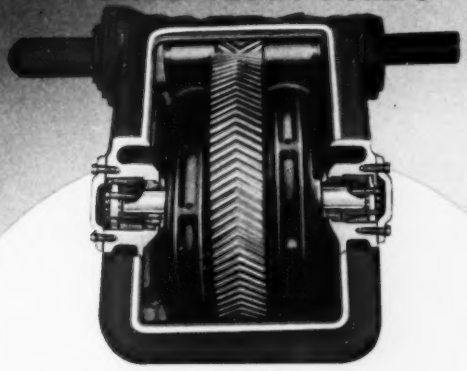

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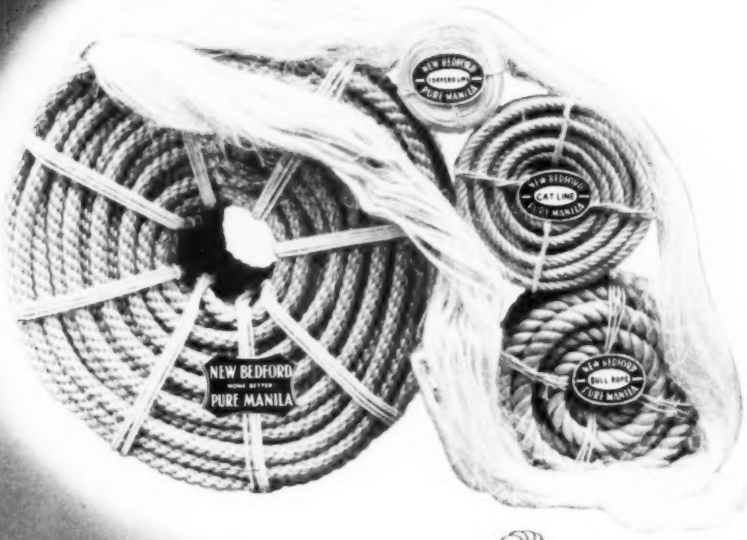

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ditions and the performance history of this pool by W. L. Horner in this reservoir indicated that pressure-maintenance operations were necessary to prevent the loss of approximately 50 per cent of the initially recoverable oil. Recoverable oil without pressure maintenance in August 1948 was estimated at 568,000 bbl. as compared with 2,085,000 bbl. predicted through a pool-wide injection program with pressure maintenance.

The field is located on the southwest flank of the Esperson dome. The fault block has 2,000 ft. of closure with a dip of 33°. No free gas occurred originally and the oil-water contact was at 8,050 ft. after a small amount of water encroachment. Natural water influx was negligible.

Midfields.—The structure is a simple anticline, elongated generally on a northeast-southwest axis. The original gas-oil contact was at —9,069 ft. and the oil-water contact at —9,091 ft. The ratio of original gas cap to oil-zone volume was 2.8. The approximate dip of the producing zone is 0-300 ft. per mile.

Old Ocean Armstrong.—The structure is a somewhat asymmetrical faulted anticline with the major axis trending in a northeast-southwest direction. The Armstrong reservoir is the second deepest of the four major producing reservoirs in the field. It is found at depths of —9,692 ft. to approximately —10,160 ft. and is comprised of an original gas cap with an oil rim. The ratio of gas-cap volume to oil-rim volume is approximately 1.6. The gas cap has an average productive interval of approximately 290 ft. The oil rim is located around the entire periphery of the structure and has a maximum net effective sand thickness of about 50 ft. with an average productive interval of approximately 170 ft. The dip of the producing zone is approximately 3 . The formation volume factor at the original reservoir pressure of 4,658 psi. was 1.574 and at the present average reservoir pressure of 3,764 psi. is 1.444. The viscosity of the reservoir oil at 236° F. was .485 at 4,658 ft. and is .441 at 3,764 psi. The solution gas-oil ratio was 1,022 at 4,658 psi. and 60° F. and 732 at 3,764 psi. and 60° F. Original reservoir temperature was 236° F. Estimated average interstitial water saturation (determined from capillary pressure tests) was 20 per cent; current water percentage is 7.4; current rate of gas injection is 87 M.M.c.f. per day.

Old Ocean Chenault.—This reservoir is the shallowest of the four reservoirs and is one of the two important oil reservoirs. It is found at depths of —9,418 to —9,725 ft. and is comprised of an original gas cap with an oil rim. The ratio of gas-cap volume to oil zone volume is approximately 3.5. The gas cap has a maximum net effective sand thickness of about 50 ft. with a produc-

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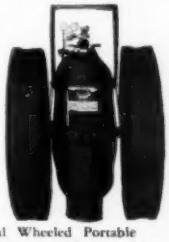

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tive interval of about 240 ft. The oil rim does not encompass the structure but is limited to the north and east flanks of the reservoir. It has a maximum sand thickness of about 40 ft. with a productive interval of about 60 ft. The dip of the producing zone is approximately 3°. Formation volume factors (from flask gas liberation tests on subsurface samples performed by the Bureau of Mines) at the original reservoir pressure of 4,472 psi. was 1.494 and at present weighted average reservoir pressure of 3,718 psi. is 1.415. Solution gas-oil ratio was 992 at 4,472 psi. and 754 at 3,718 psi. Estimated original reservoir temperature was 232° F. Average interstitial water saturation (from capillary pressure tests) was 21 per cent. Current percentage of water produced is 18 per cent. Current rate of gas injection is 54 M.M.c.f. per day.

Old Ocean Larsen. — This is the deepest and largest of the four major producing reservoirs in the field. Its structure is a faulted anticline similar to that of the upper reservoirs, however, it is more complicated because of less uniform sand conditions and faulting. The throw of the faults vary from 20 to 190 ft. and some segregation is believed to exist in a few segments. It is primarily a gas condensate reservoir with thin oil rims found in a few of the fault segments. The ratio of gas-cap to oil-zone volume is approximately 53. The depth of productive sand ranges from —10,200 ft. on the apex of the structure to —11,420 ft. on the east flank. The dip of the formation is approximately 4°. The average interstitial water saturation (determined from capillary pressure tests) is 25 per cent. The formation volume factor at original reservoir pressure of 5,200 psi. was 1.675 and at present average reservoir pressure of 4,334 psi. is 1.520. The solution gas-oil ratio is 1,080 at 4,800 psi. and 800 at 4,000 psi. The estimated original reservoir temperature was 250° F. Current percentage of water produced is 62.8 per cent. Water-injection program is in experimental stage. Pressure is not maintained.

Olive.—Pressure maintenance is expected to result in the recovery of at least 50 per cent additional oil than would be accomplished by primary depletion. This should be approximately 400,000 to 500,000 bbl. of oil and approximately 5 billion cubic feet of gas. Casing-head gas is returned to the reservoir. Structure is an anticline in the Wilcox formation at approximately 10,000 ft. An analysis of bottom-hole samples has shown that the reservoir fluid has an extremely high solution gas-oil ratio of about 5,000 and a correspondingly large formation-volume factor of about 3.5. Tests have strongly indicated that the reservoir fluid at the original formation pressure of 6,300 psi. and temperature of 250° F. is only slightly below the critical point. No effective water drive was present.

Oyster Bayou.—The Seabreeze reservoir is the main producing zone which occurs in the trapezoidal shaped fault block approximately 1,500 acres in areal extent. The total closure of the reservoir is 240 ft. with gas originally occupying the upper 60 ft. and oil the lower 180 ft. The reservoir consists of two interconnected members with different characteristics. Porosities average approximately 27 per cent in the lower phase and 29 per cent in the upper phase. Average permeability is 500 md. in the lower phase and 1,500 md. in the upper phase. Reservoir has a very good water drive, however, as water production increases it will be necessary to return all water produced together with some additional water from sands at approximately 2,000 to 3,000 ft. to maintain pressure at or above equilibrium gas saturation pressure at desired production rate. This project is in the experimental stage. The original gas-oil contact was at 8,200 ft. The upper member is 100 to 130 ft. thick and the lower member is 100 ft. thick.

Saratoga. — The water drive was negligible in the 500-ft. sand. Water from a sand at 600 ft. is injected into input wells drilled on a five-spot pattern.

Seabreeze, Reservoir III.—The Seabreeze structure is a complexly faulted deep-seated domal-type structure. Original gas-oil contact was at —8,399 ft. and the oil-water contact at 8,533 ft. Approximate dip of the producing zone is 550-800 ft. per mile. Ratio of gas-cap to oil-zone volume was 0.55. Original reservoir pressure was 3,880 psi. and temperature, 200° F.

Sugarland. — This structure is the result of a comparatively shallow salt dome which uplifts the Frio formation. The structure is almost circular in shape and is unbroken by faulting. A gas cap overlies the center of the field. Original gas-oil contact was at —3,345 ft. and water-oil contact at —3,725 ft. The ratio of gas-cap volume to oil-zone volume was 0.09. Approximate dip of the producing zone is 500-1,500 ft. per mile. Original reservoir pressure was 1,550 psi. Average of 2,079 M.c.f. per daily average flow of gas injected. Reservoir has been produced by a limited water drive supplemented by gas return.

West Columbia New.—There are approximately 80 acres in the west fault block. This pie-shaped block is bounded by faults on the north and south, by a pinchout against the salt dome on the east and by a water contact on the west or downdip side. There are four productive Frio sands ranging in depth from 4,750 to 5,747 ft., which may or may not be connected. All had a common oil-water contact at 5,747 ft. and an original reservoir pressure of 2,474. The dip of the reservoirs is approximately 26° to 30°. Salt water is injected below the oil-water contact in each of the four sand zones through two dually completed injection wells. Increase in ultimate recovery due to pressure maintenance is estimated to be 1,457,000 bbl.

North Withers. — Water injection into the Frio A sand is primarily to dispose of salt water but aids in maintaining the reservoir pressure and increasing ultimate oil recovery.

Agua Prieta.—Oil recovery creditable to pressure maintenance in this reservoir is 125,000 bbl. Estimated oil originally in place was 1,239,850 bbl. Oil production to June 1, 1949, was 323,006 bbl., leaving a remaining reserve as of that date of 916,844 bbl. Oil recovery with pressure maintenance was estimated at 275,000 bbl. and oil recovery without pressure maintenance, 150,000 bbl.

Alfred.—Original oil-water contact at —4,487 ft.; oil-water contact on February 1949 approximately —4,472 ft. Water-drive reservoir. Water injection aids pressure maintenance.

Alta Mesa.—Producing wells in the vicinity of injection wells increased in production after start of injection. Approximately 2,000,000 bbl. additional recovery estimated due to water and gas injection.

Benavides.—It is estimated that an additional 2,000,000 bbl. of oil will be recovered from the Parr sand by virtue of the pressure maintenance.

Ben Bolt.—Operator believes injection will increase ultimate recovery by 2,000,000 bbl.

Boyle.—It is estimated that the gas-injection program will result in recovery of approximately 135,000 bbl. of additional oil.

Cam.—Estimated 350,000 to 563,000 additional barrels of oil will be recovered due to gas injection. Original oil-water contact at —1,940 ft.; gas-oil contact at —1,850 ft. Monoclinal structure, sand pinchout to west.

Charco Redondo, East Segment "A." Gas-oil contact at —1,255 ft.; water-oil contact at —1,295 ft. Increased ultimate recovery of from 50,000 to 180,000 bbl. is expected due to gas injection. Connate water, 35 per cent. Expanding gas-cap drive; no effective water drive. All casing-head gas plus some extraneous gas is injected. Monoclinal structure with sand pinchout to west and oil-water contact to east.

Colorado.—Additional recovery resulting from the water flood is estimated to be 20 per cent of original oil in place. This is a thin sand of uniform porosity and with permeabilities which appear to vary little throughout any given area in the field. Viscosity of oil, 0.65 cp. at 145° F., and 50 psi. Primary recovery was by dissolved gas drive with resulting high percentage of original oil remaining in the reservoir. The structure is a monocline dipping from west to east at

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approximate rate of 150 ft. per mile. The sand appears to pinch out in all directions. Connate water is estimated to occupy 25 per cent of pore space. Sand underlies 5,120 surface acres. Two small gas caps are known to exist along the western flank, and no oil-water contact has been determined. Source of injection water is the regional Pettus sand which is some 80 ft. thick and overlies the Colorado sand by 40 to 50 ft.

East.—Productive limits of reservoir defined by a fault on the west and pinchout of the formation downdip to the east. Reservoir had a gas cap and minor effective water drive. Gas-oil contact at —4,115 ft. and oil-water contact at —4,129 ft.

Government Wells, North. — The wells produce large quantities of salt water. Portions of field have natural water drives.

Killam.—This structure is a stratigraphic trap with a sand pinchout to the west. Production had declined from approximately 100 bbl. per well per day to an average of 1½ bbl. per well per day. Operator expects to recover an additional 1 million barrels of oil by the use of water flooding. Original oil-water contact at —1,170 ft. Gas-oil contact at —1,130 ft.

Loma Novia. — The structure is a monoclinal sand lensing out to the north and west with a structural dip of approximately 70 ft. per mile to the southeast. Field was produced primarily by dissolved gas drive. Had no gas cap of significance. Primary production obtained approximately 20 per cent of original oil in place. It is estimated that a minimum of 30 per cent recovery is anticipated if the water-flooding project proves successful. Three hundred forty-three thousand barrels addition oil on this basis (Humble property).

Turkey Creek.—Ultimate recovery estimated to be increased by 1,500,000 bbl. in the Douglas sand reservoir.

Weil.—By the injection of water an additional 10,000 bbl. of oil is expected to be recovered.

While the foregoing data relate only to oil reservoirs, it should be remembered that there are, in addition to these projects, scores of cycling projects in the Gulf Coast area operating in conjunction with gas reservoirs of substantial magnitude. To list them here with the analysis of achievements involved would require a separate article in itself dealing with that particular feature of secondary recovery.

Secondary-recovery research groups have made notable advances in recent years. For example, research has indicated that the efficiency of water as a medium for displacing oil can be increased by the use of carbon dioxide gas injection in conjunction with the water injection. It has also been indicated that the efficiency of gas displacement by water is considerably less than has been generally believed. Higher recoveries from dry-gas reservoirs can be obtained by pressure depletion than can be obtained by pressure maintenance by water displacement.

The increased displacement efficiency obtained by high-pressure gas injection developed by research engineers of Atlantic Refining Co. is a noteworthy stride in increased recovery from oil reservoirs. No single method may be considered as more efficient in general, but the proper method for a reservoir must be determined from a detailed study of the characteristics of the reservoir rock and the reservoir fluids.

It should also be pointed out that the Railroad Commission recently began a series of hearings pertaining to the MER determination for the gas reservoirs in a number of Gulf Coast fields. The purpose of these hearings is to collect data upon which the commission's engineers, after deliberation and study of the facts submitted, can evolve upon an effective means of furthering conservation to even a greater degree than has been possible in the past. Expert, scientific data being assembled in this manner, to which the industry has responded generously, will be of untold value to all concerned toward more effective recovery methods in Texas.

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Mobile unit mounted on tractor, engaged in rotating the pipe and applying automatic submerged arc welding for double jointing 26-in. pipe. Location is on the right-of-way of Oklahoma Natural Gas Co. project.

Automatic Welding on Pipe-Line Right-of-Way Demonstrated

Oklahoma Natural pioneers in test to determine value of process in double jointing just ahead of pipe gang.

by Paul Reed

THE possibilities of automatic submerged arc welding on a pipe-line right-of-way recently were indicated in a pioneer demonstration on pipe-line-construction operations for a project of Oklahoma Natural Gas Co. This application of automatic welding was conducted on a sufficiently substantial scale to show that the new technique is practicable for double jointing on the right-of-way just ahead of the pipe gang.

Special movable equipment for such double jointing was designed, engineered, and built by Hillco, Inc., Tulsa, and assigned to M. E. Stevens Welding Co., subcontractor under Trojan Construction Co., the general contractor.

This method, which is applicable to double and triple jointing, has been developed to meet the pipe-line-construction-industry need for a procedure for increasing the pipe-gang output by furnishing longer joints formed by a welding process which would provide a uniform weld of superior quality. In short, the possible advantages are threefold, through reduction of the human factor, maintenance of uniform quality, and attainment of greater pipe-gang output. All operations of a pipe-line spread are speeded up by faster progress of the pipe gang, because operations behind the pipe gang can move no faster than the pipe gang itself.

Negatives of photographs of automatic welding on right-of-way being examined by Ted Martin, W. W. Thayer, and Fred Peterson, technicians of Elder & McNulty, radiographic inspection service. (Photo by R. A. Brewer).

For more than 2 years, efforts have been made to increase spread production by double and triple jointing with automatic welding at yards or rail heads, from which the long joints have been hauled to the right-of-way. In this practice there have been certain disadvantages in handling and hauling problems. For several years an alternative method has been the operation of an additional pipe gang with 100 per cent normal welding ahead of the main pipe gang. Several organizations in the past year have been working on the development of units for handling, rotating, and automatically welding the pipe on the right-of-way. Variations in terrain of course presents numerous but exacting problems in handling, lining up, and rotating the pipe.

The circumstances under which automatic welding was applied on the Oklahoma Natural Gas Co. job this year are as follows: The company let two contracts to Trojan Construction Co.—the Chickasha-Velma, Okla., 40-mile, 16-in. project, and the Edmond-Depew, Okla., 53-mile, 26-in. job. The latter line will operate in connection with the 50-billion-cubic-foot storage reservoir of the company near Depew.

Forty-three miles of the 26-in. for the Edmond-Depew job was double jointed on the right-of-way with the Hillco equipment. Approximately 10 miles was double jointed with the Hillco equipment operating in a yard. This latter operation was due to delays and intermittent receipts of pipe from the mills.

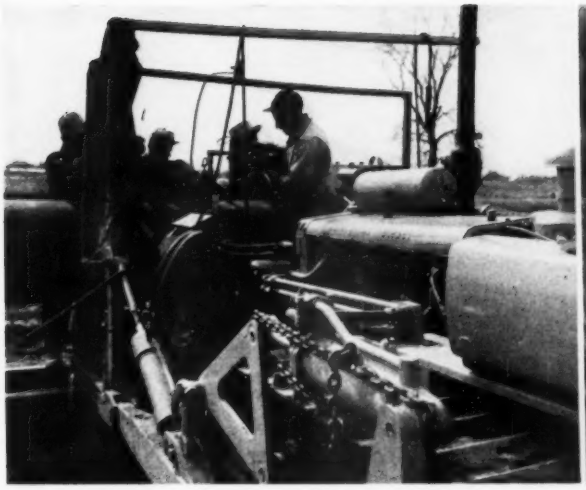
Description of Equipment

The Hillco equipment consisted of a mobile unit which carries and powers the welding generator and welding head, power rolls, and operating personnel; and two turning tables built of I-beams with rubber trunnions. The double-joint sections of pipe which have been aligned and manually welded by a one-pass bead, were placed on the turning tables by a side-boom tractor preparatory to welding with the mobile unit.

The actual rotating and welding is accomplished by equipment mounted on the front end of the tractor. A 1-kw. a.c. auxiliary generator driven by the tractor furnishes power for motors on the turning rolls, flux-recovery unit, and other electric tools. Variable-speed transmission and V-belt drive provide for variable welding speeds for the different weights and wall thicknesses of pipe. This permits a range of welding speeds from 12 to 50 in. per minute.

The submerged arc-welding equipment, 600-amp. generator, and semi-automatic welding head are Lincoln Electric Co. equipment. Welds are

(Continued on page 151)



After alignment on rollers of turning table and manual running of stringer bead, mobile unit applies automatic submerged arc welding in two passes for double-jointing operation.

Closeup view showing application of automatic submerged arc welding on 26-in. pipe on the Edmond-Depew, Okla., project of Oklahoma Natural Gas Co.

Welding Costs Reduced One-Fourth

. . . using mobile unit for right-of-way double jointing

by R. L. Looney

A MOBILE welding machine for double jointing pipe along the right-of-way has been developed by Hillco, Inc., of Tulsa, which is currently in use on a 30-in. pipe-line job in Indiana. This machine, employing the hidden arc-welding process, reduces the cost of making double-joint welds on the right-of-way by 25 per cent. It will also save about 40 per cent of the manual welding electrodes normally used for major pipe-line projects.

The welding equipment is mounted on a D-4 Caterpillar diesel-powered tractor. Welding current is supplied by a 600-amp. belted welder driven by a rear-end power takeoff on the tractor. An auxiliary a.c. generator also driven by tractor furnishes power for motors which drive the turning rolls and vacuum flux pickup.

A platform mounted on the front end of the tractor is hydraulically controlled for raising and lowering to meet various pipe levels. This platform also accommodates equipment which includes: (1) a Lincolnweld head; (2) hydraulically actuated pipe turning rolls; and (3) a flux-recovery unit which salvages unfused flux as the weld is made. The various elements of this machine are illustrated in the accompanying photographs.

The pipe is strung along the right-of-way in the usual manner. Two of the 40-ft. random lengths are aligned to form an 80 to 90-ft. section, which is held in alignment by a manually deposited stringer bead weld made with E-6010 5/32-in. electrodes. The small crew working ahead of the mobile welder aligns these sections of pipe, which are in turn picked up by a side-boom tractor and placed on the turning tables. As internal lineup clamp is used to round out the joints for applying the stringer bead.

Preparatory to applying an automatic weld, the stringer bead is thoroughly cleaned with an electric-driven wire brush to remove slag and other particles which adhere to the bevels of the pipe. The turning tables may be moved along the right-of-way progressively and spaced approximately 100 ft. apart for convenience in placing the double-joint sections of pipe on them for welding. This permits the mobile welder to operate on one turning table while the other

"Turning tables" on which pipe is aligned for running stringer bead before welding is completed by mobile automatic welding unit.

table is being unloaded, moved, and reloaded for the next operation. This feature reduces the time required for the welding machine to move from one welded section of pipe to another section which has been placed on the turning table for welding.

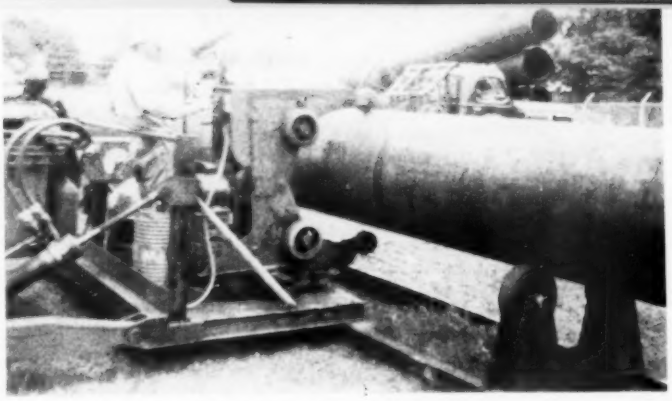
In rough terrain the turning tables are placed on a level area and the aligned sections of pipe are carried by the side-boom tractor and placed on them for welding. The first and second passes with the submerged arc automatic are deposited with a 5/64-in. L60 filler wire and 760 flux using welding heat of 325 amp. and 31 volts. Speed of rotation is 36 in. per minute. This combination of heat and speed of rotation deposits two automatic weld beads on 26-in. o.d. pipe in 4 minutes and 40 seconds. The average moving time from one turning table to the other is around 2 minutes, or a total over-all time of 6 minutes 40 seconds per weld.

Coordination of crew personnel is a factor in the operation of this equipment. With a well-organized crew the machine is able to stay well ahead of the pipe-laying gang. The machine is capable of double-joint welding on the right-of-way 5,500 to 6,500 ft. of 26-in. or 30-in. pipe per day. It is also adaptable to yard welding with equal results.

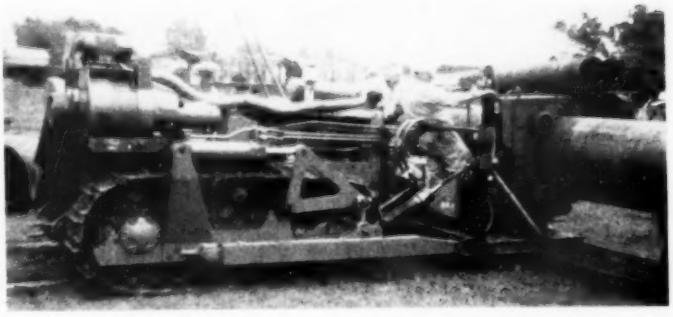
Welding Speed Not Retarded

It is interesting to note that the welding speed with this equipment is not retarded by heavy wall pipe, as the voltage and amperage of the welding current may be increased to maintain a welding speed of 30 to 38 in. per minute. This is a definite advantage over manual welding, because the heavier pipe requires additional weld beads. The process also has definite advantages in welding the higher strength pipe, such as X50 and X52.

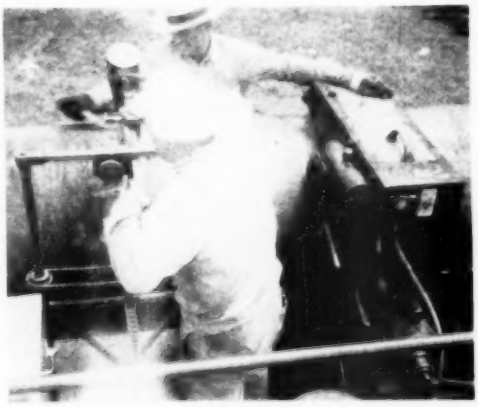
The initial automatic pass filled the V of the bevels flush with the pipe, but left it slightly concave. Slag or fused flux from the first automatic pass is removed progressively with a chipping hammer so as not to interfere with the second-pass weld. After the first automatic pass is completed, the welding current is raised to 375 amp. and 36 volts. This produces a very uniform weld about 1 16 in. above the surface of the pipe, $\frac{5}{8}$ to $\frac{3}{4}$ in. in width. It is slightly convex and feathers gently over the junction of the pipe bevels.



Power rolls of mobile unit preparing to engage pipe.



Pipe being rotated by power rolls during automatic welding.



Automatic welding at left, power roll at right, as seen from above mobile automatic welding unit.

This equipment was employed by M. E. Stevens Welding Co., subcontractor for Trojan Construction Co., for double-joint welding pipe on the Oklahoma Natural Gas Co. Edmond - Depew line. Forty-three miles of this pipe was X52, $\frac{1}{4}$-in. wall, and the remainder was 5/16-in. wall, all with 30 bevels. With this equipment the crew made 70 to 80 26-in. welds per day. The equipment is well designed and dependable, and no serious delays were encountered on the Oklahoma Natural Gas Co. job due to failures of the equipment. The welds were carefully checked for quality and uniformity by X-ray process. These welds were of excellent quality and were accepted by Oklahoma Natural's inspection staff with no rejects.

In conclusion, it appears that the pipe-line industry has materially benefited through the efforts of those who took the leadership in developing and proving this equipment in actual field construction. This method is a departure from conventional practices of double-joint welding pipe, and further improvements in the basic machine promise greater savings in over-all pipe-line construction costs. Lincoln Electric Co. has furnished welding generators and automatic heads to Hillco for building four improved machines.

THE AUTHOR

R. L. Looney, district manager for Lincoln Electric Co. at Tulsa, has been with Lincoln Electric for 28 years including 2 years on special engineering work in Mexico. He participated both in pioneering coated rods for manual welding in 1926 and later in development of automatic welding for the petroleum industry.

Automatic Welding on Pipe-Line Right-of-Way

(Continued from page 148)

made at the rate of 30 to 36 in. per minute, an average of around 34 in. for both automatic weld passes.

A crew of seven men operates this equipment, consisting of a foreman, tractor operator, welder, and two helpers; a side-boom tractor operator and one helper are required to place the double-joint sections of pipe on the turning tables.

The lineup crew working ahead of the welding crew consists of a foreman, two manual stringer-bead welders, two spacers, two clamp men, three helpers, one tractor operator, and one truck driver. Lineup-crew equipment consists of one side-boom tractor, one medium-size truck, two 300-amp. engine-driven welding machines.

The operation of the Hillco equipment used on the Oklahoma Natural job is described in more detail by R. L. Looney in an accompanying article in this issue, (page —).

This equipment was built to test the feasibility and economics of double-joint welding medium and large-diameter pipe along the right-of-way, and with the results being satisfactory, an improved Hillco unit is being built which is more compact and embodies features which will effect substantial savings in actual welding costs of this new method.

Special attention was given to inspection of welds to insure that a high standard of quality was being procured by the novel application of automatic welding on the right-of-way. Radiographic inspection furnished by Elder & McNulty was employed by the Oklahoma Natural Co. on both the Chickasha-Velma and Edmond-Depew lines.

Pipe for Oklahoma Natural jobs is protected by a 3/32-in. coating of coal-tar enamel reinforced by a wrapping of glass mat. A feature of the two projects is the fact that all creek crossings were made by overhead construction. These up to 200-ft. spans were of truss type; longer spans were of suspension type.

Sulfuric Acid Alkylation

(Continued from page 125)

disposal in situations where chemical plants were not available in the refining area. More recently the growing attractiveness of alkylation for motor-gasoline production has stimulated interest in the associated acid problem and has led to the development of several types of small-capacity, low-cost, acid-reconstitution processes. These processes lend themselves readily to literal combination with alkylation units where the situation calls for the refiner to handle his own acid problems. National defense and in-

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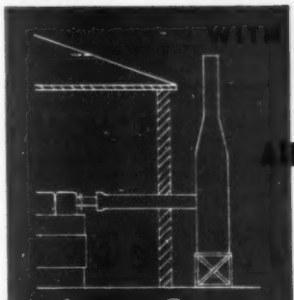

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dustrial expansion problems not only serve to point up the value of such processes to the refiner, in the face of an acid shortage and probable allocation, but also emphasize the value of spent acid to the chemical industries.

In principle, the conventional reconstitution processes burn the spent acid to SO_2, employing the contaminating hydrocarbons as fuel, and subsequently through the familiar contact method produce 98-99 per cent water-white acid. The small makeup sulfur requirement may be readily supplied by the H_2S available in most, not all refinery fuel gases, where the reconstitution is undertaken by or adjacent to the refiner. These conventional processes add approximately 50 per cent to the investment for the alkylation plant, in return for which the plant is independent of an outside supply of sulfuric acid.

The Kellogg company is presently completing research and development work upon a radically new process for recovering spent acid which promises to substantially eliminate the investment requirement for this phase of the alkylation process, while reducing the net acid requirement to an insignificant fraction of the current 0.6-2.0 lb. per gallon figures.

Combined with Cat. Polymerization

A particularly interesting and potentially broad application of sulfuric acid alkylation lies in a combined operation with catalytic polymerization. In this combination deethanization is assumed to have taken place in the poly feed prep step, the poly-unit depropanizer is operated as a debutanizer and its overhead product, consisting of unconverted C_3 and C_4 olefins plus attendant normal and isoparaffins, becomes the feed stock for the alkylation unit. The poly-unit debutanizer becomes idle and available for the debutanization of the alkylate, thereby affecting a first-cost saving on the alkylation unit.

Operating conditions on the poly unit are adjusted to obtain an olefin conversion level which will leave the unconverted olefins in the effluent in proper ratio with the isobutane available for alkylation. Decreasing severity (i.e., lower reaction temperature and higher space velocity) in the poly operation apparently selectively decreases the conversion of butylenes (as a whole) at a more rapid rate than the conversion of propylenes, and provides an olefin supply for alkylation consisting largely of butylenes. Further, the poly operation preferentially converts isobutylene to polymer and isomerizes butene-1 to butene-2 leaving the most desirable C_4 olefin for alkylation feed. In actual commercial operations the poly unit effluent under these conditions has been found to consist of 80-85 per cent butene-2, 15-20 per cent propylene, with traces of butene-1 and isobutylene.

As previously stated, this type of feed stock in commercial operation has resulted in total debutanized alkylate having an A.S.T.M. F-2 octane rating of 93-94, and A.S.T.M. F-3/F-4 aviation ratings of 107.4/159 on the 320°-e.p. aviation cut when operating at design conditions for motor gasoline. The particular plant from which these data were taken operates at relatively high spent acid strength as dictated by subsequent use of the acid. The quality of the alkylate produced from the combined poly-alky operation may be quickly evaluated by comparing the above data with Table 1, wherein typical alkylate qualities for each of the C_3, C_4, and C_5 olefins are separately presented.

For the refiner who currently employs catalytic polymerization only, this combination offers the means of obtaining complete C_3 and C_4 olefin conversion to gasoline and the exchange of high-vapor-pressure isobutane in the refinery gasoline pool for proportionately greater volumes of lower-vapor-pressure normal butane or casing-head gasoline. These factors alone, aside from the added production of the highest-quality blending stock, provide a most attractive economic picture in many refining situations.

The extent to which it is necessary to back off poly conversion in order to provide sufficient olefins to satisfy the available isobutane is, of course, dependent upon the refining conditions prior to cat poly; however, in several commercial situations recently analyzed by Kellogg, a reduction in

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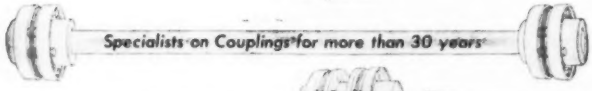

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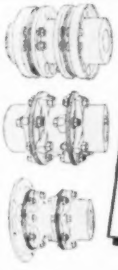

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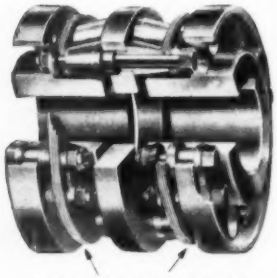

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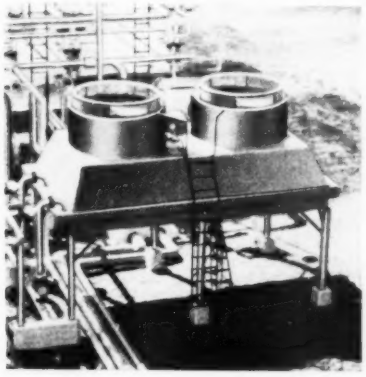

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poly production of approximately 25 volume per cent has been sufficient to supply the olefins required by the isobutane content of the refinery gasoline pool and has resulted in a debutanized alkylate production equivalent to over 80 per cent of the original cat poly production.

Economic Analyses

The economic aspects of sulfuric acid alkylation, which are presented herein, are based upon the production of motor alkylate in refineries currently including cat poly, and consequently contemplate units without rerunning facilities, and, as previously discussed — without debutanization. The quality of the aviation fraction, which amounts to approximately 95 per cent of the total alkylate, produced under the defined conditions may be considered to be equivalent to typical butylene alkylate having ratings approximating those previously set forth.

The question of the economics of aviation alkylate potentially involves the entire refinery processing sequence plus quality tradeouts in the gasoline pool. Since these conditions are more or less specific to each refiner, we have not undertaken to present a generalization at this time.

In order to evaluate the position of sulfuric acid alkylation in the motor - gasoline - production picture, we have prepared economic analyses of refining situations in which alkylation units of 500, 1,000, 2,500, and 5,000 bbl. per stream day debutanized alkylate capacity have been included. In each case the conditions, aside from capacity, are precisely the same; the principal point being to emphasize the variation in per barrel operating and investment costs for alkylation and their effects upon payout. The basic situation away from which these cases have been developed consists of a refinery gasoline pool having a composition and quality before alkylation as set forth in Table 3.

Since by assumption, the feed stock for alkylation is derived from the gasoline pool and the additional blending stocks are extraneous, there is no reason to bring into the evaluations any of the refining conditions prior to catalytic polymerization.

As a matter of record, the motor-gasoline pool shown in Table 3 represents the result of a processing sequence involving crude topping a Mid-Continent-type crude, vacuum flashing, fluid cat cracking, thermal cracking and cat cycle oil, and catalytic polymerization. The cat cracker charge amounted to approximately 42 per cent of the crude and the thermal cracking charge consisted of the total cat cycle oil above approximately 55 per cent conversion. Propane and butane recovery amounted to approximately 90 and 95 per cent of production respectively.

In each case alkylate production has

TABLE 3

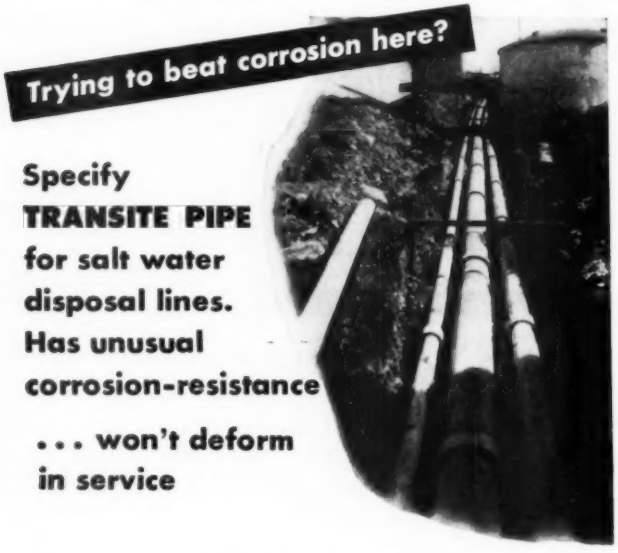
Refinery Gasoline Components Before the Addition of Sulfuric Acid Alkylation

	Vol. %
Debut. cracked and straightrun gasoline component	87.5
Debut. cat. poly.	6.1
Refinery iC_4's	3.4
Refinery C_4's	3.0
Total refinery gasoline pool	100.0
R.v.p.	10.0
C.F.R.-M. (cl.)	68.3
C.F.R.-M. +2.0 cc. TEL	79.0
C.F.R.-R. (cl.)	74.4
Cc. TEL to 85.0 C.F.R.-R.	2.0

TABLE 4

Extraneous blending stock—	Butane	Casinghead
Debut. cracked and straight-run component*	87.5	87.5
Debut. cat. poly.*	4.5	4.5
Debut. alkylate*	5.0	5.0
Inspections:		
R.v.p.	3.0	3.0
C.F.R.-M. (cl.)	93.0	93.0
C.F.R.-M. +2.0 cc. TEL	104.0	104.0
C.F.R.-R. (cl.)	93.0	93.0
C.F.R.-R. +2.0 cc. TEL	104.0	104.0
Refinery C_4's*	3.0	3.0
Extraneous blending stock*	4.2	13.3
Inspections:		
R.v.p.	56	26
C.F.R.-M. (cl.)	92	78.5
C.F.R.-M. +2.0 cc. TEL	102	90.2
C.F.R.-R. (cl.)	95	8.8
C.F.R.-R. +2.0 cc. TEL	104	91.8
Total gasoline pool*	104.2	113.3
Inspections:		
R.v.p.	10.0	10.0
C.F.R.-M. (cl.)	69.0	69.3
C.F.R.-M. +2.0 cc. TEL	79.9	80.3
C.F.R.-R. (cl.)	74.9	74.9
Cc. TEL to 85.0 C.F.R.-R.	1.8	1.8

*Volume per cent of original pool



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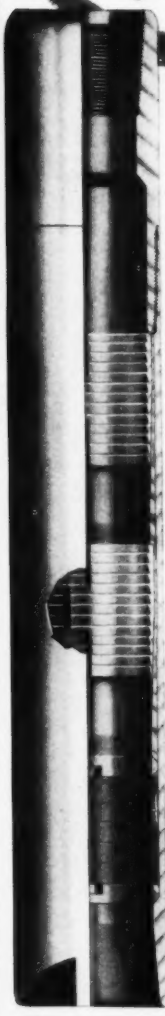

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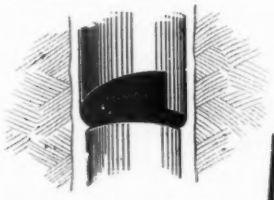
Here's all you do to make a quick positive casing repair with the Baash-Ross Casing Bowl. First, cut the casing below the defective area (Baash-Ross makes a cutting tool that is ideal for this job!) and remove the upper portion of the string from the well. Discard the defective portion of the string, replace with good casing and attach a Packing Casing Bowl to the bottom of this replacement string. After the repaired casing string is run back into the well, it is lowered until the top of the casing standing in the hole passes completely into the Casing Bowl and seats against the shoulder in the upper portion of the Bowl.



Then the string is simply raised a short distance to set the slips and expand the lead packing to a permanent, pressure-tight fit against the casing in the well . . . the casing suspended at the surface in the usual manner to retain the tension . . . *and the job's done!*

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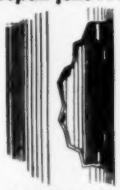

Note in the cutaway view of the Packing Casing Bowl how the upper and lower steel rings that retain the lead packing elements have a compressible joint like a piston ring. This permits them to close around the pipe along with the lead as it expands, thus preventing the lead from extruding out of the packing area. Result—a tight leakproof pack-off between the old and new casing sections, without need for cementing or other complicated sealing operations!

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Another important advantage is that the *minimum* inside diameter of the Baash-Ross Casing Bowl is equal to that of the Casing to which it is attached. Any tools, liners or other equipment that will pass through the casing string will also pass through the Casing Bowl without hanging up!

CEMENT JOB IS UNAFFECTED

Since the Packing Casing Bowl attaches to the top of the casing standing in the hole, the cement shut-off around the shoe is not disturbed. This, coupled with the tight leakproof joint effected between the Casing Bowl and the casing in the hole, assures the repaired string being just as watertight as the original casing job.

TWO TYPES—FULL RANGE OF SIZES

Baash-Ross Packing Casing Bowls are available in two types—one with a *single* set of slips for gripping the top of the casing in the hole for use with short strings of casing . . . and the other with a *double* set of slips where extra gripping efficiency is desired on longer casing strings. In both types the packing element is essentially the same.

Both the Single and Double Slip Types are available in a complete range of casing sizes. In each size the O.D. of the Casing Bowl is not much greater than that of the casing joints, so that it can readily be run inside the surrounding casing of standard casing programs. Made of heat-treated alloy steel, each size of Casing Bowl has ample strength to withstand the most severe strains and pressures with a high safety factor.

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TABLE 5—BARREL SUMMARY OF REFINERY GASOLINE POOLS

Case No.	Barrels per stream day— 1	2	3	4
Alkylation production	500	1,000	2,500	5,000
Total refinery gasoline with max. cat. poly., no alkylation	10,000	20,000	50,000	100,000
Cat. poly. plus alkylation and extrn. n-butanes	10,416	20,831	52,078	104,160
Cat. poly. plus alkylation and extrn. 26-lb. R.v.p. casing head	11,335	22,670	56,675	113,350

been based upon complete alkylation of the isobutane content of the original gasoline pool. In the interests of simplicity the isobutane content of the extraneous butane or casing head have been ignored. Following alkylation the resulting motor gasoline pools have lower vapor pressure to the extent of (72-lb. R.v.p.) isobutane conversion to alkylate. The pools have then been repressured to the original 10-lb. R.v.p. level by the addition of either commercial normal butane at 56-lb. R.v.p., or casing-head gasoline at 26-lb. R.v.p.

Table 4 presents the results of the combined "poly alky" operation and shows the composition and qualities of the final gasoline pools after repressuring with either 26-lb. casing head or normal butane.

Table 5 summarizes the volume of original, final, and extraneous materials for each case. It is evident from these two tables that the economic incentive of sulfuric acid alkylation lies in either the combination of TEL savings and butane upgrading, when butane is available, or in the upgrading of casing head where it is available.

These operations have been evaluated on the Gulf Coast product, manpower, and utility price structure as set forth in Table 6.

TABLE 6—TYPICAL GULF COAST PRICE STRUCTURE

Motor gasoline, cents per gallon	11.25
Butanes, cents per gallon	4.0
26-lb. R.v.p. casing head, cents per gallon	5.5
Fuel gas (F.O.E.), cents per barrel	60
H.P. steam, cents per 1,000 lb.	24
Cooling water, cents per 1,000 gal.	0.8
Power, cents per kwh.	0.75
Caustic, cents per pound	3.35
TEA, cents per pound	26
98 per cent sulfuric acid, per ton	$21.00
Spent sulfuric acid, per ton	$8.00
Labor (inc. P.B. & S.), man day	$58.00
TEL, cents per cc.	0.23

The direct operating costs for the various-sized sulfuric acid alkylation units are separately summarized in Table 7.

In this instance the costs are shown in terms of cents per barrel against the various debit accounts, rather than as detailed costs for steam, power, etc., in view of the fact that the utility requirements are flexible and may be broadly interchanged to fit the individual refinery problem.

It will be noted that sulfuric acid has been charged against the operations at a net cost of $13 per ton as compared to a current market price of approximately $21 per ton. This net figure contemplates a separate conventional reconstitution operation which at a 20-ton per day capacity costs approximately $6.50 per ton to operate. Of this amount approximately 65 per cent is labor which remains fixed as the capacity rises. Allowing double the operating cost against fixed charges and ignoring the effects of larger capacity, a figure of $8 per ton has been estimated as the value of 88-91 per cent spent acid. In view of Kellogg's progress toward a simplified acid-recovery system, this figure—and the resultant 25 cents per barrel acid charge against alkylation—may be considered as extremely conservative. Preliminary figures indicate potential elimination of acid charge as a significant factor in the operating cost of sulfuric acid alkylation.

Over-all Economics

Briefly summarizing the over-all economics, from Table 8, sulfuric acid alkylation installations of from 5,000 to 500 bbl. per stream day capacity payout (i.e., earn their investment cost) in from only 3 to 9 months basis purchase of 26-lb. R.v.p. casing-head blending stock at 5.5 cents per gallon. When normal butane is purchased at 4.0 cents per gallon these same alkylation units pay out in from 0.7-2.9 years. In the latter cases the payout may be materially improved if the extra butane represents additional butane recovery from refinery fuel gas.

If the capital cost of conventional acid reconstitution is included with the investment for sulfuric acid alkylation, and a combined operation is undertaken allowing due credit for the further reduction in net acid cost, the range of payouts for the total investments rise to 0.36-1.10 years when buying casing head and 1.0-3.75 years when buying butane.

In conclusion, it should be noted that the economic attractiveness of alkylation, in any refining picture, is a function of the availability and qualities of isobutane, olefins, and blending stock. The presence of a catalytic cracking unit alone affords the

TABLE 7—SUMMARY OF DIRECT OPERATING COST OF SULFURIC ACID (ALKYLATION UNITS, GULF COAST PRICE STRUCTURE)

Alkylation capacity, bbl. per stream day	500	1,000	2,500	5,000
Operating labor, cents per bbl.	38.7	19.3	7.7	3.9
Chemicals and utilities, cents per bbl.	26.7	26.7	26.7	26.7
Sulfuric acid, cents per bbl.	25.3	25.3	25.3	25.3
Maintenance, cents per bbl.	9.1	6.1	4.3	3.4
Royalty, cents per bbl.	15.0	15.0	15.0	15.0
Total	114.8	92.4	79.0	74.3

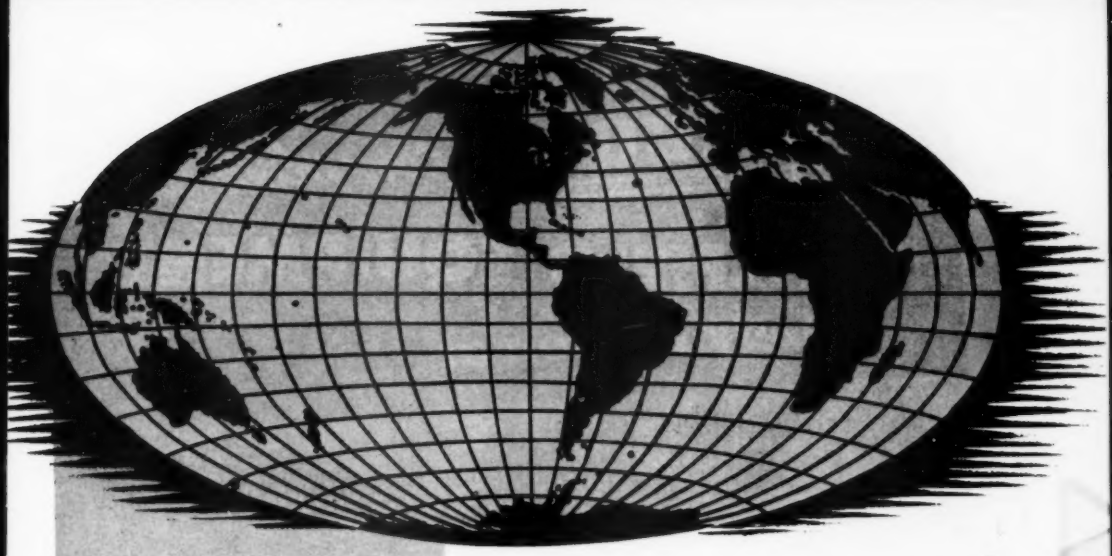

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TABLE 8—SULFURIC ACID ALKYLATION FOR MOTOR AND AVIATION GASOLINE
Over-all Economic Summary—Gulf Coast
(Basis 328 operating days per annum)

Case number	1		2		3		4	
Alkylation unit capacity (B.P.S.D.)	500		1,000		2,500		5,000	
Extraneous stock	Butane	Casing head	Butane	Casing head	Butane	Casing head	Butane	Casing head
Credits—Incremental above base gasoline pool ($ per C.D.)	1,767	5,679	3,534	11,354	8,836	28,383	17,690	56,771
Debits—Incremental above base gasoline pool ($ per C.D.):								
Butane	628		1,255		3,138		6,283	
Casing head		2,774		5,549		13,872		27,743
Operating cost	517	517	832	832	1,778	1,778	3,344	3,344
TEL	—109	35	—218	70	—544	175	—1,088	350
Fixed charges (10% of investment)	164	164	220	220	383	383	603	603
Total incremental debits*	1,200	3,490	2,089	6,671	4,755	16,208	9,142	32,040
Net incremental credits,* $ per C.D.	567	2,189	1,445	4,683	4,081	12,180	8,548	24,731
Net incremental credits,* $ per year	207,000	799,000	527,400	1,709,300	1,489,600	4,445,700	3,120,000	9,026,800
Approximate investment, $ per B.P.S.D. alkylate	1,200	1,200	800	800	560	560	440	440
Payout on investment, years	2.9	0.75	1.52	0.47	0.94	0.31	0.70	0.24

*Before depreciation.

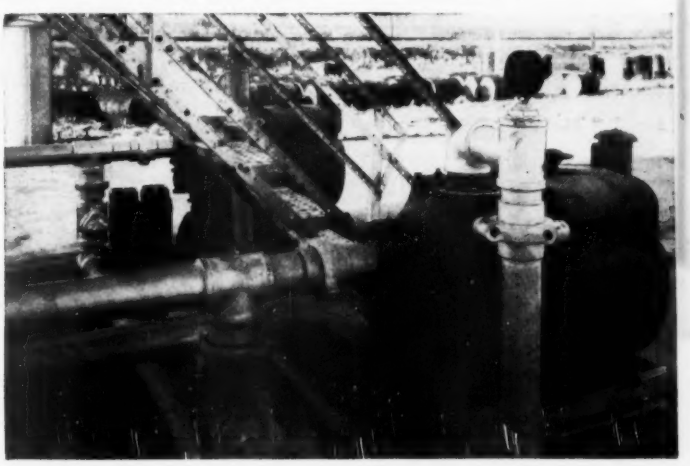
refiner wide flexibility in the control of both production and ratio of isobutane and olefins.

The refining situation presented herein included no naphtha processing. Here again a wide variety of processes and processing conditions, available in many refineries, offer an additional and flexible source of isobutane and olefins. In practice the isobutane content of extraneous casing head or butanes would often be available as additional alkylation feed stock. All of these factors can serve to increase the production ratio of alkylate to motor gasoline, over the general picture presented, and consequently can serve to improve the economic advantage for alkylation.

Actually the refining conditions upon which we have based the foregoing economics are relatively unfavorable. The production of both olefins and isobutane is substantially minimum and neither normal butane nor 26-lb. R.v.p. casing head are as attractive blending stocks, economically speaking, as 16-20-lb. R.v.p. casing head. Furthermore we have ignored the operating cost savings in the catalytic polymerization unit due to decreasing its severity of operation. Commercial operations have indicated to date that poly catalyst life may be doubled or better by a reduction in the severity of the magnitude required for the combined operation.

Aside from the contemplated use of the poly unit debutanizer in alkylate service, the alkylation units represented herein are independent units. Still greater economy both in first cost and operating cost is available through the design and construction of alkylation units in combination with light-ends recovery fecilities and/or cat poly.

The combined effects of these conditions, coupled with the general economic conclusions presented, and our progress toward freedom from both large net acid costs and requirements, indicate a position of economic advantage for sulfuric acid alkylation which merit the serious consideration of every refiner.



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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Apparently Vanadium (Compound) Vaporizes

Note. — Our survey of information about vanadium in crude oils which appeared in the five issues of November 30, December 7, December 21, December 28, 1950, and January 4, 1951, brought to our attention another publication on this subject. Other new articles are also introduced.

P. Schlapper, P. Amwerd, and H. Preis published a paper entitled "Investigations on the Attack of Heat-Resistant Steels by Oil Ashes Containing Vanadium" in the German publication Schweizer Archiv fur angewandte Wissenschaft und Tecnic, Vol. 15, October, pp. 291-299. The following abstract appeared in the Battelle Library Review, January 1950, p. 27:

"Results of experiments at 650°-850° C. show that vanadium-containing fuel oils greatly accelerate the scaling of heat-resistant steels if the temperature is above the melting point of the mineral residue, that the rate of attack increases with temperature, and that it is proportional to quantity of reacting material and to exposure time. Alkali in the residue also affects the rate of attack, but no attack occurs in a reducing atmosphere. Mechanism of attack is explained. Includes photographs, graphs, and tables."

The same paper may be summarized as (by P. A. Portsmouth of Husky Oil & Refining, Ltd.):

"The action of fuel-oil ashes containing vanadium on heat-resistant steels, in the temperature range from 650° to 850° C., has been investigated. The results were as follows:

"1. Fuel-oil ashes containing vanadium very markedly accelerate the scaling of all the heat-resistant steels which were investigated, provided that the temperature was above the melting point of the ash.

"2. The attack strongly increases with rising temperature.

"3. It also increases proportionally to the quantity of the reacting material and the time of exposure.

"4. Besides the vanadium content of the fuel-oil ash also its alkali-content influences the extent of the attack.

"5. In a reducing atmosphere no attack occurs.

"6. The mechanism of the attack seems to consist in the fact that the vanadium compounds prevent the formation of, or destroy, the protective scaling on heat-resistant steels. Layers permeable to oxygen and of little resistance to scaling are formed. The vanadium compounds apparently act as oxygen carriers, with vanadates as an intermediary stage. The existence of such vanadates has been proven rontgenographically, and the upper limit of their temperature stability was approximately determined.

"7. Steels containing molybdenum are particularly strongly affected. Under the influence of the vanadium compounds molybdenum trioxyde is formed, which sublimates from the scale leaving it in a weakened state. The action of vanadium containing ash on molybdenum steels is characterized by a puncture-type attack.

"These experimental results were coordinated with the general laws of the scaling reaction."

The paper of Frances M. Wrightson, "Determination of Traces of Iron, Nickel and Vanadium in Petroleum Oils," Analytical Chemistry, 21, 1543 (1949), appears to indicate that vanadium may be present in the form of organic compounds in petroleum. At least, vanadium appears in vacuum distillates in small amounts. It is possible that the vanadium in the distillates appeared by mechanical entrainment, but this does not seem probable nor is such a possibility suggested in the article. Iron and nickel also appear in the distillate. However, the amount of metal in the distillate is very small compared with the metal in the feedstock, ranging from under 1 up to 4 per cent for the sample of highest metal content.

Discussions at the November 1950 meeting of the A.S.M.E. concerning vanadium are reported by George Weber in the November 30, 1950, issue of The Oil and Gas Journal, p. 48. Although vanadium was selected as the culprit, nearly all experts expressed a lack of certainty that vanadium alone was at fault, and most of them thought that the use of additives was the most promising method of alleviating the effect on ash. Representatives of Lummus Co., Hartford Electric Light Co., General Electric Co., and Gulf Oil Corp. participated in the discussions.

Cost of Power

What are good costs for diesel-engine power and for steam power?— S. P. C.

This question was answered in detail in The Refiner's Notebook No. 213 in The Oil and Gas Journal of September 9, 1948, page 109, but since fuel prices have changed since that time, the computations have been reported using basic fuel units that can easily be corrected to current prices by ratio. The basic fuel prices used in computing Table 1, and approximate delivered prices as of today are:

	Basic fuel price	Approx. price today
Natural gas, c/M.c.f.	10	20
Electric power, c/kw.-hr.	1	1
Diesel fuel, c/gal.	10	13
Gasoline, c/gal.	10	14
Steam:		
Gas fuel, c/M.c.f.	10	20
Fuel oil, $/bbl.	1	2
Coal, $/ton	10	8

As an example, if the cost of diesel fuel (delivered) is 13 cents per gallon, the cost of 1 hp. from Table 1, namely, 0.63, is multiplied by 13/10 or 1.3, obtaining 0.82 cent. Likewise, for a steam engine (noncondensing), cost of fuel oil is now about $2 per barrel and hence the cost of 1 hp. is 1.24 times 2 or 2.48 cents (Table 1). Current power costs are approximately as follows:

	Cents per b.hp.
Gas engine	0.33
Electric motor	0.89
Diesel engine	0.82
Gasoline engine	1.65
Steam engine:	
Gas fuel	1.52
Oil fuel	2.48
Coal	2.41
Steam pumps (small):	
Gas fuel	4.54
Oil fuel	7.44

Of course, these costs are applicable only to regions where the respective fuels are readily available.

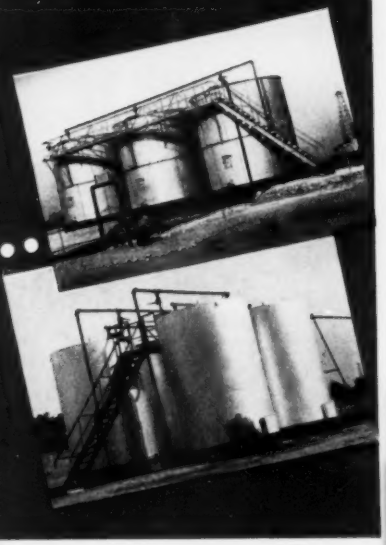
TABLE 1—COST OF 1 B.HP. (BASED ON BASIC FUEL COSTS SHOWN ABOVE)*

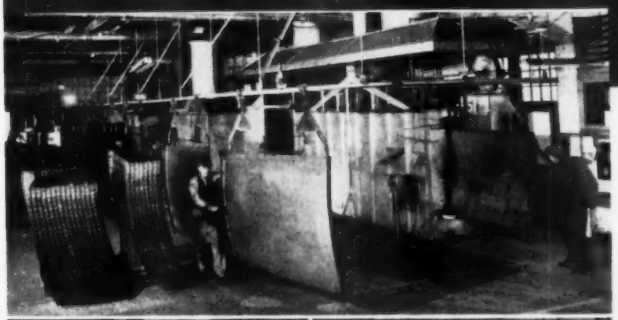
	Basic price of fuel, power or steam			Properties of fuel			Cost, cents per hp.		
Type of drive	Per common unit (cents per 1,000 lb.)	Per lb., cents	Per 10⁶ B.t.u., dollars	A.P.I.	Pound per gal.	B.t.u. per cu. ft. or lb.	Fuel	Lube	Total
Gasoline engine	†10	1.64	0.80	60	6.15	20,250	1.14	0.04	1.18
Gas engine	‡10	0.215	0.085			1,050	0.145	0.02	0.165
Electric motor	§1		2.93				0.88	0.01	0.89
Diesel engine	†10	1.43	0.73	37	7.0	19,650	0.60	0.03	0.63
Steam engine (noncondensing):									
Firing gas	15		0.149			1,050	0.75	0.01	0.76
Firing fuel oil	24.7		0.245	7	8.5	18,400	1.23	0.01	1.24
Firing coal	60		0.595			14,000	3.0	0.01	3.01
Small steam pumps:									
Firing gas	15		0.149			1,050	2.25	0.02	2.27
Firing fuel oil	24.7		0.245	7	8.5	18,400	3.7	0.02	3.72

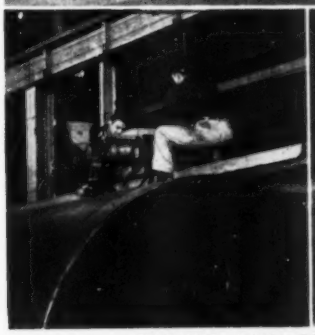
*For detailed computations and conditions, see The Oil and Gas Journal, September 9, 1948, page 109. †Cents per gallon. ‡Cents per M.c.f. §Cents per kw.-hr.

M C

BOLTED STEEL TANKS
WELDED STEEL TANKS







OVEN TREATMENT TO 700° PROVIDES MORE DURABLE PAINT BOND

One reason why M.C. bolted tanks are superior is that each sheet is oven heated by the Maloney-Crawford EXCLUSIVE process (shown at left) to 700° F. to remove all scale and film before paint is applied. While still hot, the sheets are painted with primer and rust inhibited second coat. The "drying from inside" process provides an especially firm bond with the steel.

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One reason why M.C. welded tanks are superior is that they are automatically welded and decks and bottoms flanged (as shown at left) to provide greater strength. In addition, each tank is hydrostatically tested to insure freedom from leaks.

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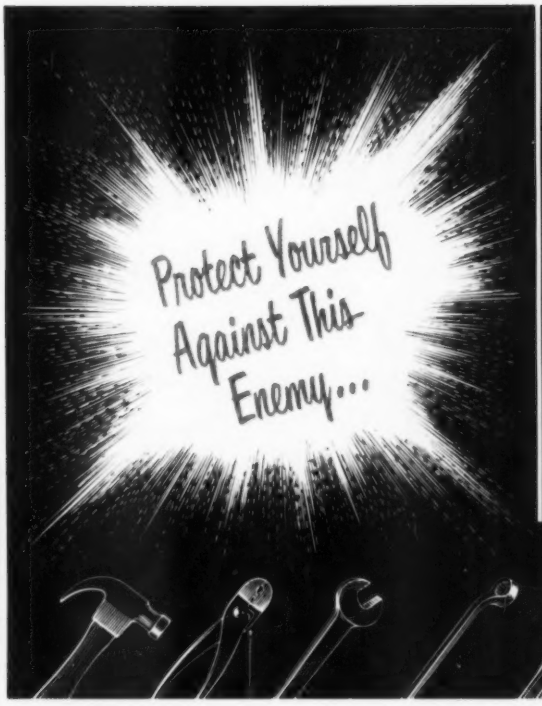

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Role of Bottom-Hole Pressure Surveys in Field Performance

DECISIONS as to frequency of field-pressure surveys are made usually by field engineering committees, by regulatory body orders, and by field rules. In large water-drive reservoirs, field-pressure surveys are desirable frequently during early life of field to evaluate ultimate reserves and rate of water influx.

Surveys taken as often as a month apart during early field life may prove to be of major field utility in determination of: (1) volume of oil in place, (2) magnitude of water drive, (3) need for extraneous water or gas injection, (4) determination of proper oil-withdrawal rate for field, (5) optimum well spacing desired adequately to develop remainder of field, or (6) need for additional penetration of pay thickness. However, as a major field approaches full development, and production rates are stabilized, frequency of surveys may be reduced to routine operating control.

Early Data Important

During the first few months, management as well as reservoir engineers are interested in existence of and magnitude of water drive principally for per well reserve estimates. In this connection, taking of a reservoir sample, from either bottom-hole sample or from recombining oil and gas effluent from separator, will permit the accurate determination of the fraction of voidage replaced by encroaching water. *(See Engineering Fundamentals, No. 449, June 28, 1951.)*

With only a few wells on production, it is a relatively easy matter of shutting in all wells for taking bottom-hole pressures. Even with this precaution, it is important to determine how much time should elapse to obtain true static bottom-hole pressure. Another problem is to determine the original static reservoir pressure upon which all material-balance work is predicated.

Consider a reef lime reservoir in the Wolfcamp (Permian) series of West Texas. From core data, it is known that the reservoir generally has a low order of matrix porosity and permeability; average matrix porosity from one well was only 5.54 per cent and average permeability (above 0.1 md.) was 15 md.

TABLE 1

Bottom-Hole Pressure Data Anderson-Prichard Oil Corp. 1 H. C. Bevers, Wellman Field, Terry County, Texas

(Test datum —6,519 ft.)

Survey date	Observed static b.h.p. (psig.)	Change from— Previous survey	Change from— Maximum pressure
7-24-50	4,142	0	0
10-12-50	4,178	+36	0
1-12-51	4,138	—40	—40
4-12-51	4,152	+14	—26

Cumulative oil production from 7-24-50 to 4-12-51 = 75,550 bbl.

Pressure drop from maximum pressure to 4-12-51 = 26.

Producing efficiency from 7-24-50 to 4-12-51 75,550/26 = 2,906 bbl. psi.

Here the original maximum observed bottom-hole pressure of 4,178 psi. may or may not be the true original bottom-hole pressure; normal hydrostatic pressure would be 4,253 psig. based on 434 psi. per 1,000 ft. of depth. Note again the apparent gain of 36 psi. from first observed reading of 4,142 psi.

Pressure Buildup Survey

Here again the value of a buildup survey cannot be overestimated. *(See Engineering Fundamentals No. 450, July 5, 1951.)* Examples referred to in that installment are carried in graphic form on this page for emphasis. Consider the case of a reservoir exhibiting rapid buildup characteristics. Fig. 1 portrays the bottom-hole-pressure buildup of a well producing from the Dundee (Devonian) dolomite of Central Michigan where high permeabilities were created by secondary dolomitization. From bottom-hole pressure of 960 psig. observed at a flow rate of 310 bbl. per day, pressure built up to 1,361 psig. in only 2 hours and to the asymptotic pressure of 1,372 psig. after a total of 4 hours.

For typical buildup characteristics of a tight dolomite reservoir see Fig. 2. These data were taken from a well (31-22n-11w) in Chester (Mississippian) series in Ringwood field of Major County, Oklahoma. Average porosity was 12 per cent and permeability 2 md. Bottom-hole pressures rose from 1,061 psig. at the end of 24 hours to only 1,350 psig. at the end of 96 hours and pressures were still rising.

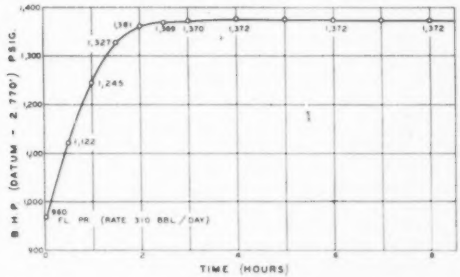

Fig. 1—Pressure buildup curve for a high-permeability reservoir, Dundee (Devonian) dolomite in Central Michigan.

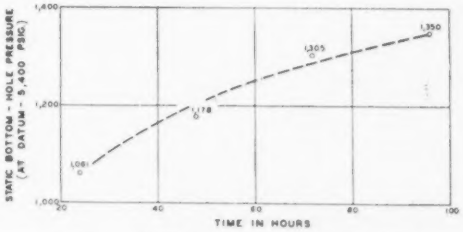

Fig. 2—Pressure buildup curve for a low-permeability reservoir: Chester (Mississippian) dolomite in western Oklahoma.

By Joseph A. Kornfeld, Mid-Continent District Editor, Tulsa

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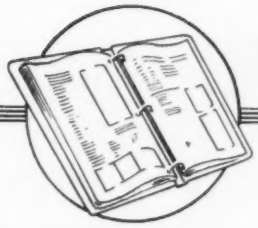

THE REFINER'S notebook

No. 84

Cleanout Openings for Oil-Storage Tanks

by I. E. Boberg* and L. P. Zick†

3. RING STRESS

SUMMARY of results obtained in experimental and field testing of bolted cleanout openings is presented, beginning with this number of The Refiner's Notebook.

It is a recognized fact that restraint of the shell by the bottom affects the distribution of the ring stress in the lower portion of the shell. The measured ring stresses in the continuous portion of the shell near the bottom of the two field test tanks are plotted in Fig. 1. Theoretical curves have also been plotted. These assume that each vertical element of the shell is a beam on an elastic foundation. In one case the joint between the shell element and the bottom is assumed fixed and in the other case the joint is assumed pinned. A comparison of the measured and theoretical values indicates that the actual condition lies somewhere between the two extremes.

In order to simplify the ring stress curve for design purposes, the area under the theoretical curve below the point of maximum stress, B, using the pinned assumption was set equal to the triangular area below point A as shown in Fig. 1. The resulting approximate expression for the height X, of point A above the bottom, in inches, is given by:

$$X = [(H + 350)/27{,}700] R + 2$$

Where H is the height and R is the radius of the tank, both in inches.

Tanks built under A.P.I. Standard 12-C specification are designed for a unit stress of 21,000 psi. at 85 per cent joint efficiency or 17,850 psi. at a point 12 in. above the bottom. The ring stress at any point varies directly with the height of the liquid above the point. Then, when X is greater than 12 in., the ring stress S in pounds per square inch at point A is given by:

$$S = [(H - X)/(H - 12)] 17{,}850$$

For design, since the heights of the openings under consideration are small, the ring stress at and above point A is assumed equal to a constant, S; below point A the ring stress is assumed to vary linearly to zero at the bottom.

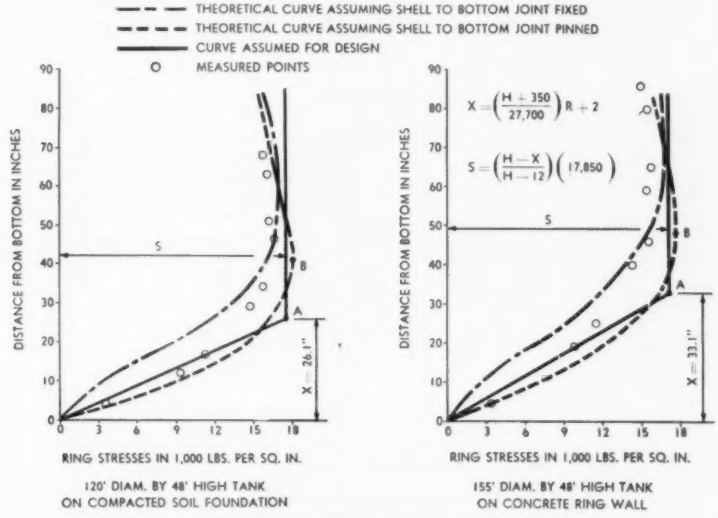
THEORETICAL CURVE ASSUMING SHELL TO BOTTOM JOINT FIXED
THEORETICAL CURVE ASSUMING SHELL TO BOTTOM JOINT PINNED
CURVE ASSUMED FOR DESIGN
MEASURED POINTS
DISTANCE FROM BOTTOM IN INCHES
S
B
A
X = 26.1"
RING STRESSES IN 1,000 LBS. PER SQ. IN.
120' DIAM. BY 48' HIGH TANK
ON COMPACTED SOIL FOUNDATION
$X = \left(\frac{H + 350}{27{,}700}\right) R + 2$
$S = \left(\frac{H - X}{H - 12}\right)(17{,}850)$
X = 33.1"
155' DIAM. BY 48' HIGH TANK
ON CONCRETE RING WALL

Fig. 1—Plot of ring stresses in continuous shell near bottom.

*Chief engineer and †research engineer, Chicago Bridge & Iron Co.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 ECONOMICAL USE OF STEAM. Booklet 2171 consists of 16 questions and answers regarding the efficient use of steam and improving the output of steam-heated machines. *Sarco Company, Inc.*

2 BULLETIN W-404-B4 explains Rollo valves for viscous liquids and liquids with solids. Illustrations are also shown. *Worthington Pump & Machinery Co.*

3 PUNCH-LOK HOSE CLAMPS AND FITTINGS. A detailed 12-page catalog describes and illustrates the Punch-Lok method and its many applications, and lists the standard clamps, locking tools, and special fittings available. *Punch-Lok Co.*

4 STEAM TRAPS for power plants, steam-distribution systems, and steam processes are covered in a 23-page multicolored bulletin, which also includes installation and operating suggestions. Prices, weights, and dimensions are shown. *Yarnall-Waring Co.*

5 CLEANING COMPOUND. File sheet describes Mempo compound for cleaning radiators and blocks. The product prevents and dissolves scale and corrosion in engine radiators, water lines, treaters, and cooling towers. *Metallic Phosphates Co.*

6 PRESSURE-TESTING FOR PIPE AND TUBING. An illustrated bulletin describes in detail how Hydro-Test finds leaks in tubing while being pulled, while it is being run back into the well, or at the rack. *Hydro-Test, Inc.*

7 ROTARY TYPE PUMP. Bulletin WQ-50 illustrates and describes in detail the Warren-Quimby Rotex pumps, including both sectional and exterior views, dimensions, selection chart, and specifications. *Warren Steam Pump Co., Inc.*

8 A NEW SLIDE-RULE, designed to assist in cathodic protection of pipe lines, gives required magnesium anode size and life, length of pipe protected, and current output. *Federated Metals Division, American Smelting & Refining Co.*

9 AIR SEPARATION PLANTS FOR OXYGEN, NITROGEN AND THE RARE GASES is a new booklet describing these plants as used for large or small-scale production of oxygen, nitrogen, and gases such as technical argon. Technical data is included on each model plant. *Petrocarbon, Ltd.*

10 RUST CONTROL. How an efficient rust-control program for preventing and removing rust can contribute importantly to longer service life for petroleum equipment, reduced unit replacement, and reconditioning costs is covered in a special service report. *Oakite Products, Inc.*

11 VERTICAL TURBINE-TYPE PUMPS is an eight-page catalog describing Class APH-APK line of vertical, turbine-type pumps applicable to bulk liquid transfer, cooling tower, dewatering, and similar services available in single, or multistage

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Aug. 16, 1951

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COMPANY NAME .....

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construction, ranging in size from 6 to 30 in., for capacities to 15,000 g.p.m. and pressures to 250 psi. *Ingersoll-Rand Co.*

12 TUBING AND SURFACE SAFETY VALVES. An eight-page bulletin describes the purposes, operating principles, and design details of these valves, and illustrates typical installations. Information on subsurface valves for dually completed wells also is included. *Otis Pressure Control, Inc.*

13 STOP CORROSION WITH TAPE is a four-page multicolored bulletin explaining how Scotch electrical tape presents effective resistance to moisture, alkalies, oils, fats, and fungi. Wrapping illustrations and other pertinent information is included. *Minnesota Mining & Manufacturing Co.*

14 STEAM TRAPS. Catalog 751 illustrates and describes industrial and expansion steam traps, weight operated, piston operated, and other types. Price lists and capacity tables are shown, together with operation and application data. *W. H. Nicholson & Co.*

15 CATALOG 51, profusely illustrated, presents a complete line of adjustable pipe hangers, vibration eliminators, and supports, together with specifications and an informative technical section. *Blaw-Knox Co.*

16 TUBE OIL HEATERS AND PREHEATERS are described and illustrated in a 15-page bulletin which also includes diagrams and capacity and dimension charts. *Water Tube Boiler & Tank Co., Inc.*

17 DRILLING RIG. Bulletin 380 explains the Ideal Type T-32 drilling rig, together with eight illustrative pages featuring rig design, operation, and controls, and includes specifications, performance chart, dimensional drawings, and drive-arrangement diagrams. *National Supply Co.*

18 HIGH COMPRESSION ENGINES FOR USE WITH PROPANE MOTOR FUEL. Technical bulletin contains quotations from leading automotive and petroleum engineers relative to savings and economies inherent in propane operation. It presents comprehensive data on price trends, supply, and distribution facilities. *Twin Coach Co.*

19 MAGNO-THERM OXYGEN RECORDER is a functionally designed, fully indexed bulletin, divided into sections covering introduction and an application table, an illustrated explanation of analysis, a diagrammed description of the recorder, and a charted discussion of results. *Hays Corp.*

20 CORROSION CONTROL. Bulletin 5013, a two-color folder covering the causes of return-line corrosion, lists two corrective treatments, and includes test procedures for both treatments. *Dearborn Chemical Co.*

21 METERING FLOWS IN CRUDE OIL OR REFINERY PRODUCTS PIPE LINES is covered in a four-page bulletin which outlines operating principles and application of the Brown electric flow-meter system. *Minneapolis-Honeywell Regulator Co.*

22 RECIPROCATING PUMP. A two-color, eight-page bulletin, Data Sheet 67-A describes the Aldrich 6-in. direct-flow pump series, with full details of design and construction, including dimension and sectional drawings, performance data, and pump specifications. *Aldrich Pump Co.*

23 PILLOW BLOCKS. A highly informative catalog gives valuable pointers on construction, application, and installation of Jones Timken equipped pillow blocks which range in sizes to take shafts of 1½ to 9-in. diameter. Engineering data, bearing capacities, dimension drawings, and lubrication information, is included. *W. A. Jones Foundry & Machine Co.*

24 ACME'S 1951 CATALOG contains a complete line of machine tools, machinery, industrial, and plant-maintenance equipment, with illustrations and price lists. *Acme Equipment Co., Inc.*

25 OIL ENGINES. Publication 323, a six-page, three-color folder discusses four-cylinder or six-cylinder supercharged or normally aspirated engines and is well illustrated. Specifications, performance chart, and sectional drawings are shown. *Rolls-Royce, Ltd.*

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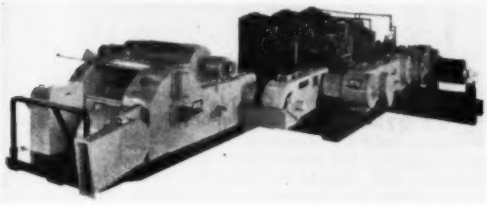
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Dan B. Miller

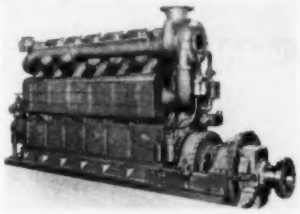
26 RIG MODEL U-20 is designed for economical drilling from 7,500 to 12,000 ft., and incorporates many features found only in larger rigs. Designed for 1,000 net horsepower input, it has six speeds forward and two reverse to the drum and rotary table. An outstanding



feature of the draw works is the large free-spooling drum. A 26½-in. diameter by 50-in. long drum barrel affords long wire-line wear, 52-in. diameter by 10⅜-in. wide, full-water-circulating, forged-alloy steel, heat-treated brake rims. Design stresses short bearing centers on short transmission shafts. All components and parts are accessible for quick repairs and adjustments. All moving parts are lubricated by directed oil flow from two independently driven oil pumps mounted in parallel. High and low speed Air-O-Matic friction clutches actuated by single lever, operate drum speeds. Master clutch is built into compound. A new compartment design permits simple conversion from single to double drum. A high-speed hydromatic brake, with automatic water control, is mounted inside the draw-works case. By removing catheads and a few minor parts, the overall width meets highway requirements. The rig is designed for electric motors, torque converters, fluid couplings, or mechanical drives. Compounds are available for two, three, or four engines. Two-pump drives are available. *Unit Rig & Equipment Co.*

IT'S NEW CHECK IT

27 NORDBERG SUPAIRTHERMAL ENGINE is available in a complete range of sizes from 425 to 3,200 b.hp. for stationary applications. The engines are of the four-cylinder type and are built for operation on diesel fuel, duafuel, and spark-fired gas. The engine's most notable characteristic is its ability, in any given size, to produce one-third more horsepower than the conventional supercharged engine with no greater heat to the cooling water and without increasing the internal surface temperature or pressures. The engine improves upon the conventional turbocharged engine in four important ways: First, a greater amount of air cooling within the cylinder is accomplished by blowing a larger volume of cooler air through the cylinder and out the exhaust pipe. Second, the turbocharger delivers air to the cylinder at a higher pressure, thus providing 30 per cent more of air and making it possible to burn more fuel. Third, by means of an intercooler on the discharge side of the turbocharger, the temperature of the intake air is cooled before it enters the cylinder. Fourth, by closing the intake valve before the end of the intake stroke, the air within the cylinder is expanded from 15 to 6-lb. pressure, at full load and the intake air is thereby cooled another 50° F. *Nordberg Manufacturing Co.*



IT'S NEW CHECK IT

28 SPANGWELD DRILL PIPE is a new product on which a welded connection is employed between the tool joint and the upset ends of the drill pipe. The com-

pany is prepared to furnish every type and size of joint now in common use. Also available are many different combinations of joint and pipe O.D.'s that cannot be furnished when screwed connections are used. Hard-faced

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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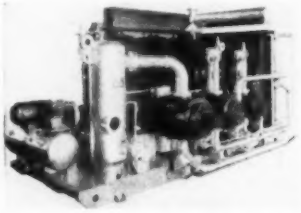
tool joints are optional in standard sizes. Hard-facing material is inlaid by automatic-welding equipment in six bands. Three pads spaced 120° apart around the 18° taper of the elevator shoulder are also provided. Concentrated electric induction-heat treatment of the weld relieves any residual stresses. Machining operations remove upset and weld flash inside and outside. Magnaflux inspection and hydrostatic tests are applied to every length of Spangweld. *Spang-Chalfant Division, National Supply Co.*

IT'S NEW CHECK IT

29 TWO NEW PACKAGED COMPRESSOR PLANTS with more horsepower per pound than previous models, are the 330-hp. 6 SVG and the 400-hp. 8 SVG. New design has doubled the amount of available horsepower per pound. These packaged units are complete plants, including every component and control usually found in large fixed-compressor stations. The gas-handling system, including scrubbers, piping, manifolds, and cooling system, is gas-engineered for each plant to meet the particular operating conditions. Each packaged plant includes forced-lubrication equipment; a cooling system for oil, gas, and water; a compressed-air starting system; surge tanks for water and fuel gas; and automatic safety controls. The entire plant is completely assembled and mounted on a welded-steel base. It requires only three connections to be put on stream. Plants are used for gas lift, flare-gas collection, field-gas gathering, and injection. *J. B. Beaird Co., Inc.*



IT'S NEW CHECK IT

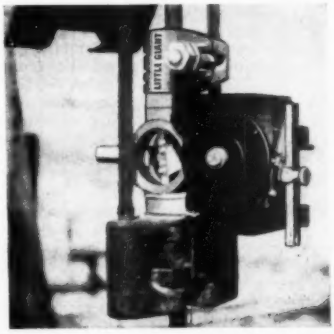
30 MAGNETIC FISHING TOOL of permanent-magnet type has been developed for insurance runs and for other fishing operations. The tool utilizes a reverse-circulation system and a rotary shoe to loosen metallic junk in the hole and bring it within the tool's powerful magnetic field. This field is controlled and localized directly at the pole plate. No magnetism emanates from any other part of the tool. The magnet itself is capable of picking up from 250 to 1,200 lb. of iron or steel, depending upon the size of the tool. The rotary shoe both loosens and pulls material into the magnetic field and provides clearance for the tool itself when obstructions such as bridges are encountered. Conditioning of the mud can be handled at the same time the hole is being cleared of junk. *K & G Tool & Service Co.*

IT'S NEW CHECK IT

31 McCULLOUGH FLEXIBLE GLASS JET PERFORATOR. With more power and less explosives this perforator is particularly applicable in small pipe where more power is needed, since oil operators have formerly hesitated using the maximum safe charge of explosives in fear of damaging the casing. Another improvement has been the use of a 50 per cent stronger, retrievable, flexible-steel strip carrier. Due to its flexibility it can be lowered into the hole below a bad place in the pipe or past a sharp dog leg or kink in the casing. Added strength of the new steel strip carrier permits 100 per cent recovery of the strip, eliminating the possibility of debris. The glass jet units are used in a steel strip carrier and in a solid steel gun body. In small pipe or damaged pipe the flexible steel strip carrier is used, since it does not limit the size or effectiveness of the charge. The charges can be set as close to the casing as possible and there is no body to split and stick in the hole. *McCullough Tool Co.*

IT'S NEW CHECK IT

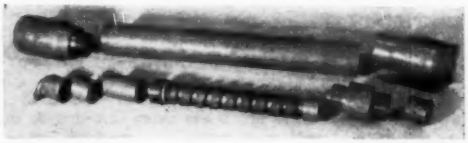
32 J-F DYNAMOMETER is a simple-to-operate instrument used for operational control of pumping wells. By calculating the deflection of a steel proving ring, it measures and records the pumping load at every point in the stroke and measures counterbalance effect at the



polished rod. It tells when the traveling valve in the pump opens on the down stroke and gives an indication of the working fluid valve, the weight of the fluid, and the stability of the pumping operation. It records unnecessary loads and measures horsepower being transmitted to the sucker-rod string at the polished rod. *Johnson-Fagg Engineering Co.*

IT'S NEW CHECK IT

33 INTERMITTING CONDENSING REGULATOR. This new surface regulator is for controlling the gas ratio



of oil wells. It forms a fluid seal in the sand, thus holding the gas in the sand and condensing the lighter gases

Save Top Carrier ROLLS

with

STOODY 1027

Don't throw top carrier rolls away! They're too hard to get these days. When the tractor is down for repairs to track, sprockets, idlers or rollers—rebuild top rolls with Stoody 1027.

Stoody 1027 gives longer service, resists the wearing of flat spots when rolls freeze up with mud. Rolls should be rebuilt before too serious wear occurs.

See your Stoody dealer . . . or write for folder on welding procedure for top carrier rolls.

STOODY COMPANY

11938 EAST SLAUSON AVENUE, WHITTIER, CALIFORNIA

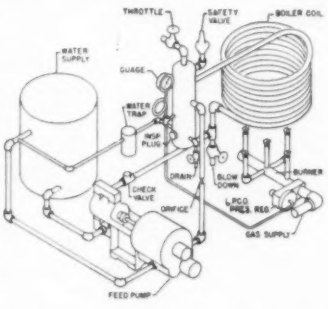
giving a higher gravity oil and longer life to the well. This regulator is for penalized wells as well as new wells. In some wells it has cut the flow of water considerably. *Gas Oil Ratio Control Co.*

IT'S NEW CHECK IT

34 CHALLENGER MARK III DIESEL CRAWLER TRACTOR is powered by a Meadows 6-cylinder, 4-stroke diesel engine developing 95 b.hp. at 1,550 r.p.m. Change-speed gearbox containing six forward speeds ranging from 1.50 to 5.67 m.p.h. and four reverse speeds from 2.08 to 5.13 m.p.h. Main frame designed with flush finished underside giving ample ground clearance. Tracks are of pin and bush type. Equipment mountings and drilled facings are integral parts of the basic design and provided as standard for the fittings of a full range of ancillary equipment. *John Fowler & Co. (Leeds) Ltd.*

IT'S NEW CHECK IT

35 AUTOMATIC ORIFICE CONTROL WATERMAN BOILER. This is a complete unit for treating oil to remove water and change viscosity. It is made in 30-hp. size and has a 200-lb. working pressure, wet or dry steam. The unit has only three working parts. The firebox is eliminated; no pit is required for either open or closed-steam systems. It is a complete unit, ready to be connected to fuel and water lines. The feedwater pump, burner, and necessary controls are an integral part of the generator. Electricity is required only for the oil-fired unit, which has an electrically operated blower. The gas-fired generator does not need any electrical connection. Control automatically functions to maintain the unit in heat and water balance under all operating conditions. Automatic orifice control makes this unit extremely efficient. *Vanderlei Manufacturing Co.*



IT'S NEW CHECK IT

36 LOW-COST COPYING MACHINE. Engineers, designers, and chief draftsmen will find Model 20 ideal for the medium volume production of prints from tracings, engineering drawings, and other large-sized technical originals. Accounting departments and business offices will find it an economical, time-saving tool for copying large-sized records, balance sheets, charts, and cumulative statistical statements and reports kept by the day, week, or month for production, inventory, sales, and cost control. The new Copyflex machine offers a 46-in. printing width with exposure speeds up to 95 in. per minute. Operation does not require special training. Operator feeds the sensitized medium into the machine with the translucent original to be copied. Copies are processed by the machine and are stacked ready for use. *Charles Bruning Co., Inc.*

IT'S NEW CHECK IT

37 ELECTRONIC AMPLIFIER weighing less than 2 oz. and capable of magnifying electrical impulses three million times presents a new concept of miniaturization of electronic equipment. The new amplifier requires only 35 separate parts. Because of its compactness and plug-in design, replacement of the tiny amplifier can be made in a matter of seconds. It is an expendable item replaceable by a complete new unit when maintenance is required. *Bendix Radio Division of Bendix-Aviation Corp.*

IT'S NEW CHECK IT

38 NEW RUBBER FRAME GOGGLE, designed to provide a gas-tight seal and recommended specifically for gas, fume, and smoke hazards, is constructed without any ventilation slots in the rubber frame to prevent infiltration of air. When the goggle is perfectly fitted, a gas-tight seal results. Headband of the goggle enters slots in the outer goggle frame and not through a slit in the lens. Also, screw-headed bolts on the front of the goggle are made of noncorroding stainless steel. The new goggle may be obtained in combination with American Optical's R2000 or R5000 respirators. These combinations can be supplied permanently riveted together or as separate units. *American Optical Co.*

IT'S NEW CHECK IT

39 NEW TYPE OF FLOW METER has functional design, gives fast and accurate response over an entire range and features low initial cost and maintenance. It includes such advantages as an evenly graduated meter scale and electronic integration. It is available either as a mechanical flow meter with integral recorder, or as an electrical transmitter to be used with a Brown inductance bridge receiver. It is supplied in three ranges: 53, 119.25 and 212 in. of water, and for 750 and 1,500 psi. static pressure. For dry calibration the three ranges are slightly greater. *Minneapolis-Honeywell Regulator Co.*

IT'S NEW CHECK IT

NATURAL GAS

Transco Plans Set

Firm finances capacity increase of 50,000 M.c.f.

HOUSTON. — Transcontinental Gas Pipe Line Corp. has completed arrangements for financing to increase rated deliverability of its 1,840-mile Texas-to-New York pipe line 50,000,000 cu. ft. to a total of 555,000,000 cu. ft. *(The Oil and Gas Journal, April 5, page 111).*

The capacity increase, authorized by the Federal Power Commission, is expected to be reached by next March, but part of the added capacity will probably be available by December of this year.

Financing arrangements will also cover construction of the Staten Island-Narrows crossing to Brooklyn, the bridge over the Atchafalaya River, additional crossings of the Delaware and Mississippi rivers, company housing projects, the installation of a microwave-communications system, and a $10,000,000 increase over original cost estimations for the big Transco line. This is 4.2 per cent more than was anticipated.

Claude A. Williams, Transco president, said the firm will seek increased rates due to higher labor and material costs as well as higher state and federal taxes.

Williams said the company's proposed 27-mile extension to Connecticut for serving gas to the Northeastern Gas Transmission Co., subsidiary of Tennessee Gas Transmission Co., will not be built at present. Northeastern notified Transco that it expects to receive a supply from Tennessee sufficient to serve all its existing markets. A daily quantity of 64,000,000 cu. ft. of gas set aside for Northeastern will be sold temporarily in Transco's present market area.

Demand from customers for more than the 555,000,000 cu. ft. authorized has led Transco to consider a construction program to meet the demand as soon as work on the present expansion is completed, Williams said.

FPC to Rule on Alberta To Montana Gas Imports

WASHINGTON. — A hearing expected to set a precedent on importation of natural gas into the United States has been rescheduled for September 10 in Billings, Mont., by the Federal Power Commission.

Montana Power Co., Butte, is seeking authorization to import gas from fields in the Pakowki Lake area in southeastern Alberta. Two newly formed subsidiaries of Montana Power would produce and transmit the gas in Canada through about 18 miles of 16-in. line from the field to the United States border thence through about 52 miles of 16-in. to a connection with the company's existing system near Cut Bank, Mont.

The 18-mile segment of line would be owned and operated by one of Montana Power's new subsidiaries.

The hearing was originally set for August 20 in Washington. However, National Coal Association, United Mine Workers of America, and Railway Labor Executives Association, all intervenors in the proceeding, asked that the hearing be postponed to a date not earlier than September 15 and held in Montana.

Local coal and railroad interests in Montana, Wyoming, and Utah informally urged the commission to grant the request.

Flood Forces Michigan Firm To Cut Industrial Service

DETROIT.—Michigan Consolidated Gas Co. will curtail service to its industrial users of natural gas August 24 due to a stoppage of deliveries of gas from Texas for a 2-week period last month.

The Missouri-Kansas flood broke Michigan-Wisconsin Pipeline Co.'s big gas line at Kansas City, preventing delivery of several billion cubic feet. This forced Michigan Consolidated to draw on gas stored in underground fields in Michigan to supply its western Michigan customers. The curtailment has been ordered under interruptible contracts to insure domestic users of an adequate supply this winter, said a company spokesman.

A somewhat heavier load on the system this year also has helped bring about the early precautionary measures, he said.

United Fuel Gas Applies For $9,700,000 Rate Boost

WASHINGTON.—United Fuel Gas Co. has applied to the Federal Power Commission for a 20 per cent, $9,700,000 increase in its wholesale service to five utility customers. If granted, the rate boost, which is based on anticipated sales for the year ending June 30, 1952, would be in effect from July 16, 1951.

The company said the increased rates are necessary because of an increase in rates of one of its suppliers of gas, Tennessee Gas Transmission Co. The commission suspended Tennessee's increased rates in July and deferred their use until December 16.

Wholesale purchasers who are affected by the proposed increase are: Atlantic Seaboard Corp., Central Kentucky Natural Gas Co., Manufacturers Light & Heat Co., Ohio Fuel Co., and Portsmouth Gas Co.

Alabama Gas Units O.K.'d

WASHINGTON.—Alabama-Tennessee Natural Gas Co., Florence, Ala., has received a certificate of public convenience and necessity for construction and operation of eight gasline taps and meter and regulator stations at points on its transmission system in Alabama.

Natural Gasoline

Skelly Doubling Capacity Of Velma, Okla., Plant

Skelly Oil Co. has launched an expansion and construction program which will more than double the capacity of the company's Velma, Okla., natural-gasoline plant.

Skelly will also build a booster station about 6 miles southeast of the main plant to increase deliveries of casing-head gas.

Enlargement of the plant and construction of the booster station will enable the Velma installation to process 73,000,000 cu. ft. of gas per day.

Skelly said it has in mind the future possible conversion of the booster station into a natural-gasoline-absorption plant when its Velma-field production grows enough to warrant such conversion. This is expected to be not far in the future.

N.G.A.A. Meet to Houston

HOUSTON. — The thirty-first annual convention of the Natural Gasoline Association of America will be held here April 30-May 2, 1952, in the Rice Hotel. It will be the first N.G.A.A. convention to be held at Houston.

The association headquarters in Tulsa also has scheduled three regional meetings: Southern regional, Blackstone Hotel, Tyler, Tex., October 19; Panhandle-Plains regional, Herring Hotel, Amarillo, December 7; and Permain Basin regional, Odessa, Tex., early in February.

L.P.G.-Storage Cave O.K.'d

BRECKENRIDGE, Tex.—The Texas Railroad Commission has granted Warren Petroleum Corp. permission to use a cave near here in Stephens County for storing L.P.G. products.

The cave is located near Warren's Breckenridge natural-gasoline-extraction plant. It has walls of nonporous limestone, and an estimated storage capacity of a million gallons.

H C Smith
OIL TOOL CO.
GENERAL OFFICES, EXPORT OFFICE AND PLANT
COMPTON, CALIFORNIA

Among the Drilling Contractors

Number of Active Rigs Still Breaking Records

The number of operating rotary rigs in the United States and western Canada continues to mount to successively higher all-time records. At latest report (week ended August 6) there were 2,748 active rigs in the two countries. This number, only 4 short of the 2,800 mark, represented an increase of more than 90 rigs over the number running a month ago and more than 500 above the number running during the corresponding week a year ago.

Drilling activity during the week was at high levels in all areas although only in the Rocky Mountain region was a new record established. In the latter area, the number of active rigs increased to 183, the greatest number ever reported. The 923 rigs reported running in the West Texas-New Mexico area fell 6 short of the peak recorded 2 weeks ago, but, as in most areas, the number increased during the week.

ACTIVE ROTARY RIGS*

Area	Week ended 8-6-51	Change week ended 7-30-51	Change week ended 8-7-50
Gulf Coast	596	+ 2	+ 98
W. Tex.-N. M.	923	+ 9	+177
Ark.-N. La.-E. Tex	160	— 4	+ 3
Oklahoma	310	+ 5	+ 60
Kansas-S. Nebraska	181	— 7	+ 60
Illinois-Eastern	149	— 5	— 4
Rocky Mountains	183	+ 16	+ 71
Pacific Coast	160	+ 14	+ 12
Total U. S.	2,662	+ 44	+477
Western Canada	134	+ 4	+ 39
Total	2,796	+ 48	+516

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Pacific Coast and Illinois-Eastern areas are shown on pages 204 and 205.

Clarke Drilling Co., Billings, Mont., is moving a rotary rig to a wildcat location in 17-10n-7w, Box Elder County, Utah, where it will drill a Mississippian test for Utah Southern Oil Co. of Salt Lake City. Location is for 1 Bar-B Ranch.

B. B. Carter Drilling Co. is drilling for Ginther, Warren & Ginther at 1 Noonen, NE SW SW 24-2s-59w, a wildcat test on the east flank of the Byers structure, Adams County, Colorado. Hole is projected to the Dakota.

Noble Drilling Co., Tulsa, is setting up for another well to be drilled for The Texas Co. in Lake Borgne, Orleans Parish, coastal Louisiana. The new test, 1 State-Shell Point, is located northwest of the operator's recently completed gas discovery well. Productive zone of the latter well is at 8,360-70 ft.

Wright Active in Three New Contracting Firms

Clinton E. Wright, who recently resigned his 16-year association with Buda Engine Sales & Service, Inc., Tulsa, returned from an extended vacation in western Canada last week, and has announced his active association with three drilling - contracting organizations. One of these is a partnership, with F. M. Stevenson, operating as Signal Oil Field Service, with headquarters in Great Bend, Kans. This firm operates eight cable-tool rigs in Oklahoma, Kansas, and Colorado.

C. E. WRIGHT

In addition, the two men operate Signal Drilling Co., with headquarters in the Mayo Building, Tulsa, running two rotary rigs in the Sussex area of Wyoming. Wright is vice president of the firm and Stevenson president.

Also announced is the recent formation of Signal Exploration, Inc., with Wright as president and Stevenson as vice president, to operate a rotary unit on contract in Texas. Headquarters are in Tulsa.

At the time he left Buda, Wright was vice president and sales manager. He disposed of his interest in the company when he terminated his connection in June.

Noble Drilling Co., Tulsa, has the contract for a 10,000-ft. test which California Co. is starting at a wildcat location a mile west of the Bayou Pigeon area in Iberia Parish, coastal Louisiana. The test is being drilled as 1 Bourgeois. Location is in 14-12-10e.

Kern & Trimble tools are being used by Skelly Oil Co. to drill its 2 Lane, a projected 4,300-ft. test in the Fouke area, Miller County, Arkansas. Location is in the SE NW NE 28-16s-26w.

T. T. Eason & Co., Oklahoma City, is starting a test at a wildcat location 2 miles southwest of Duncan, Ste-

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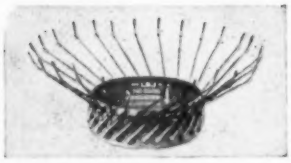

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phens County, Oklahoma, on a contract with C. V. Richardson of Oklahoma City. Location is in the SE SW SE 12-1s-8w. Hole is projected to 5,500 ft.

Lewis Drilling Co., Wichita, is drilling for **Brown Drilling Co.**, Los Angeles, at the latter's 1 Patented, NE SE NE 11-16n-48w, a wildcat 8 miles northeast of the Gurley field, Cheyenne County, Nebraska. Pennsylvanian sands will be tested.

Bateman Drilling Co., New Orleans, has moved a heavy rig to the west flank of the St. Gabriel field, in Iberville Parish, coastal Louisiana, where it will drill a 10,500-ft. test for British-American Oil Producing Co. Location is on state prison farm land in 80-9s-1e.

Kirk & Krueger, Inc., Cody, Wyo., has the contract for a 7,500-ft. Madison test which Seaboard Oil Co. has projected in the Whistle Creek area, in northeastern Park County, Wyoming. Location is in the NE NW SW 16-56n-98w.

Gilger Drilling Co., Houston, is drilling for Anderson-Prichard Oil Corp. at 1 Miles Knolle, a wildcat in the S. F. Austin 4 League Grant, Austin County, Texas. Location is 1¼ miles west of an oil discovery well recently completed by Sun Oil Co.

Justiss-Mears Drilling Co., Jena, La., has taken a contract for a Miocene sand test to be drilled for Lyjan Oil Co. in the area 8½ miles east of Hope Villa in Livingston Parish, Louisiana. Location is 1-A Livingston Lumber Co.

Ryan Drilling Co. is making hole on a contract with Lion Oil Co. calling for a 6,700-ft. or pre-Cambrian test at 1 Chrismer, a wildcat in the SE SW SE 2-2n-48w, Yuma County, Wyoming.

W. A. Aggas is the contractor on outpost test which E. G. Bradley of Wichita is starting at 1 Oswalt, W½ SW SW 34-17n-8e, ⅜ mile southwest of the South Bellvue pool, western Creek County, Oklahoma.

Dorris Ballew, Inc., Natchez, Miss., is starting a wildcat test for Sunray Oil Corp. at 1 O'Kelly, in 48-6n-2w, a mile southeast of the South LaGrange field, Adams County, Mississippi.

Mountain States Drilling Co., Cody, Wyo., is drilling for Carter Oil Co. in the Willow Creek area, Uintah County, Utah. The test is 1 Unit, NE SW 21-11s-21e.

Davis & Wharton tools will be used by C. E. McCaughey on a projected 6,500-ft. test which the latter operator will drill on his Curley lease in the NW NW NE 9-24n-1w, northwestern Noble County, Oklahoma.

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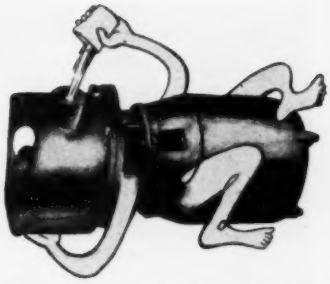

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¼ to 5 H.P. ratings, open and closed impellers. Capacities to 120 G.P.M. Heads to 135 ft., suction lifts to 25 ft. Flexible coupling, or close-cupld motor drive. Send for Bulletin 636.1.

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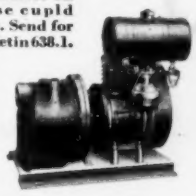

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The partners in this joint venture are H. E. (Herb) Fisher, A. S. Crutcher, Gene Rolfs and Jim Cummings. Fisher has been associated with the engineering design and construction of pipe lines for 20 years and recently resigned as Chief Engineer of the Standard Oil Co. (Ind.) Pipe Line Department. The other members of the new firm . . . Crutcher, Rolfs and Cummings . . . have been leaders for nearly twenty years in developing, manufacturing and supplying the pipe line industry with the principle work equipment now in use throughout the world.

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PIPE LINES

Louisiana Program

Interstate Oil Pipe Line to build new crude lines

INTERSTATE OIL PIPE LINE CO. plans construction in 1952 in Louisiana which will increase deliveries of crude oil to Esso Standard Oil Co.'s Baton Rouge refinery.

Interstate has received authorization from the Petroleum Administration for Defense for construction of 47 miles of 16-in. from Sunset, La., to a point near Baton Rouge. This will replace an existing 8-in. line which has been operating with three portable-booster installations in addition to the main station.

The company is now laying 35 miles of 12-in. from a point near New Iberia to Sunset replacing 6-in. and 8-in. pipe lines. When the 12-in. and 16-in. lines are completed, the capacity of this section of the Interstate system will be increased to 75,000 bbl. daily. The company will lay spurs from New Iberia to Weeks, Avery Island, and Duck Lake fields.

Another 1952 project consists of 68 miles of 16-in. line from Raceland to Baton Rouge. This will replace existing 8-in. lines with temporary booster stations and increase capacity to refinery from 40,000 to 60,000 bbl. daily. New spur lines will be laid to the line south of Raceland.

On the Shreveport - Baton Rouge main system, Interstate plans to lay a 33-mile 20-in. line from Bunkie to Melville. It will replace five 8-in. lines and two 12-in. lines new being used.

Preparatory to this change in facilities, a new station is to be built at Bunkie starting late this year. The new station will have three 1,200 hp. dual-fuel engines connected to centrifugal pumps. Some of the existing engine and pumping equipment at this station has been in operation since 1909. It consists of 100 to 300 hp. diesel units connected to reciprocating pumps.

Great Lakes Completes New Line, Ups System Capacity

KANSAS CITY, Mo.—Great Lakes Pipe Line Co. has completed construction of its 8-in. pipe line between Iowa City and Des Moines, Iowa, and has increased capacity of its 12-in. main from Barnsdall, Okla.

According to Harry Moreland, president, the construction has eased the strain on the company's products system in the area by increasing potential supply at both Iowa City and Chicago delivery terminals.

Gasoline for Iowa City is being pumped through the new 106-mile line from Des Moines, permitting the 6-in. Chicago-Des Moines line to be used exclusively for supplying Chicago.

Great Lakes has reactivated pump stations at Lee and Prophetstown, Ill., and has placed the 6-in. line on 50-mile operation to increase capacity.

New pumping units have also been installed at Independence and Paola, Kans., Osborne, Mo., and Osceola, Iowa, to increase capacity into Des Moines. Additional storage facilities are being installed at the Chicago terminal, and more tanks are on order for Iowa City.

Heat Handicaps

116° temperatures slow work on new Service line

BOWIE, Tex.—Construction work on Service Pipe Line Co.'s 135-mile crude line from here to Jud, Tex., was slowed last week by temperatures which wavered from 114° to 116°.

Smith Contracting Corp., building the line from the Brazos River west to Jud in northwestern Haskell County, lost a full day when welders succumbed to the heat. Smith had layed about 22½ miles of the 57.3 miles of 10-in. line specified in the contract by the latter part of the week—about 31 per cent.

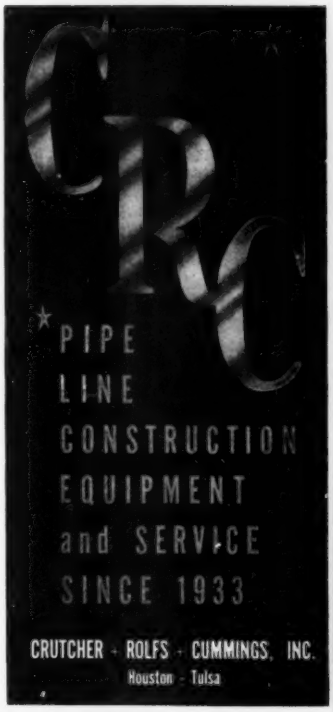
Working east from the Brazos River, O. R. Burden Construction Corp. has welded 18 miles of line. This segment of the line, about 27.4 per cent complete late last week, is being constructed through the eastern part of Throckmorton County and through Young, Archer, and Clay counties to Bowie in Montague County.

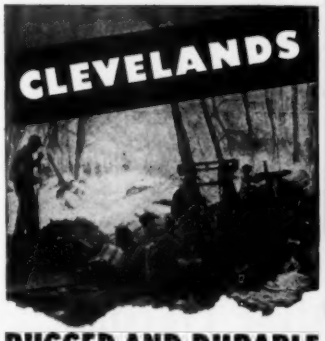
Burden headquarters are in Henrietta, where a pipe - reconditioning yard also is operating. The yard has cleaned and reconditioned 21.75 miles of a total of 36.5 miles.

Another yard at Haskell has cleaned, repaired, and straightened 20 miles of 10-in. taken up in Missouri, Illinois, and East Texas for this project. About 13.5 miles remain to be reconditioned.

At Olney and Hajeck, 57 miles of 10-in. pipe taken up in Nebraska has been unloaded and is being strung along the right-of-way east and west from the Brazos.

Service's new line, when in operation, about the middle of September, will provide an outlet for increasing oil production in Stonewall, Haskell, and Knox counties. Gathering systems will connect production in Old Glory, Kiowa Peak, and North As-





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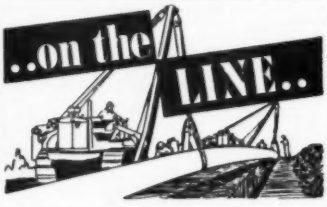
permont fields of Stonewall County, South Haskell field of Haskell County, and North Knox City field of Knox County. *(The Oil and Gas Journal, July 12, page 113).*

Texas Eastern Awards River-Crossing Contracts

SHREVEPORT. — Texas Eastern Transmission Corp. has awarded to Pentzien, Inc., Omaha, a contract for the construction of 30-in. submarine crossings of the Cumberland and Kentucky rivers.

Oklahoma Contracting Co., Inc., Dallas, has been awarded contract for construction of a 30-in. crossing under the Tennessee River.

The crossings are part of Texas Eastern's $114,000,000, 791-mile line from Kosciusko, Miss., to Connellsville, Pa.



Fish Firms Near End Of Texas-Illinois Work

FISH ENGINEERING CORP. and its associate, Fish Pipeline Construction Corp., Houston, are in the final stages of construction of the 1,400-mile large-diameter pipe-line system stretching from the Gulf Coast to Joliet, Ill., for Texas-Illinois Natural Gas Pipeline Co.

The Texas-Illinois work comprises construction of approximately 1,400 miles of line including 1,000 miles of

RAY C. FISH

J. P. BRISTOW

30-in. pipe and five 10,000-hp. compresser stations. The line will have an initial capacity of about 300,000,000 cu. ft. of gas per day.

The Houston firm, Fish Engineering Corp. and its associate, Fish Constructors, have just completed work on Trancontinental Gas Pipe Line Corp.'s big line to the East. They are now installing the first expansion program, consisting of additions to 12 compres-

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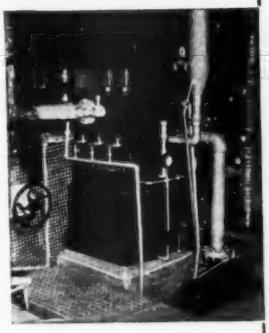

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Reduce maintenance with D-F S-E* *Joints*

Shortages of manpower require you to build stamina in your lines. **Directed-Flexing Self-Equalizing*, an exclusive feature of Badger Expansion Joints, assures all-curve flexing in the corrugated member. Thus, localized flexing stresses cannot form . . . metal fatigue cut to a minimum . . . breakdowns are virtually eliminated.

But that's not the whole Badger story. In addition to controlling the flexing movement *within* each corrugation, the specially designed Self-Equalizing Rings also control intra-corrugation movement. For unbeatable stamina be sure you get the exclusive Badger combination — Directed-Flexing Self-Equalizing — when you buy . . . specify Badger Expansion Joints for every job.

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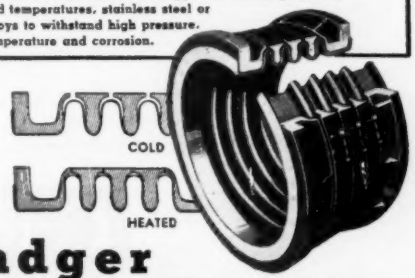
Fabricated from deoxidized copper for normal pressures and temperatures, stainless steel or alloys to withstand high pressure, temperature and corrosion.



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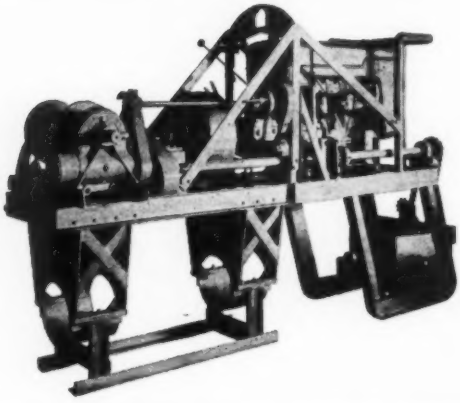
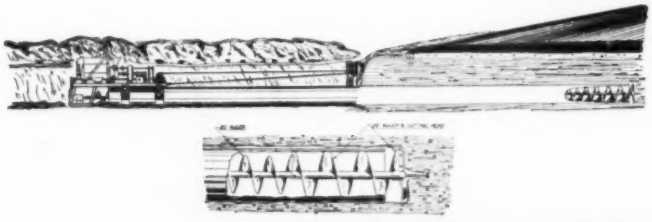


CROSE AUGER TYPE ROAD BORING MACHINE installs pipe casing up to and including 34" in diameter. This machine has proven highly satisfactory with Pipe Line Contractors for the fastest method of installing pipe casing where rock is not encountered. Machines for installing casing larger than 34" in diameter are also available.



M. J. CROSE
MANUFACTURING COMPANY, INC.
2715 Dawson Road TULSA, OKLA. Phone 6-2173

sor stations. This project is known as the Piedmont Expansion Program.

Personnel.—Ray C. Fish is president of Fish Pipeline Construction Corp. His construction experience began in

R. D. RICKETTS

C. B. AMES

the middle 1920's in California and was added to in work through the Mid-Continent and Gulf Coast. While Fish Engineering Corp. is relatively young, all key men in the organization have had many years experience in pipe-line and allied industries.

J. P. Bristow, vice president of the firm, is in charge of the Texas-Illinois project for Fish. Bristow has been associated with the gas industry for many years, having been affiliated with Northern Natural Gas Co., and for 6 years vice president in charge of operations of Tennessee Gas Transmission Corp.

R. D. Ricketts and C. B. Ames are also vice presidents and associated ac-

O. L. MULLEN

J. R. IMBER

tively with the project. Each has been engaged in the oil and gas industry and is expert in pipe line and compressor station design and construction.

Headquarters.—Headquarters for wok on the Texas-Illinois project is at Houston, where Bristow is in charge of the over-all project. O. L. Mullen is manager of construction; J. R. Imber is secretary-treasurer. Other staff members are: J. D. Creveling, manager of the land department; J. R. Waite, Jr., chief engineer; M. T. Duddleston, assistant to Waite; and C. E. Witt, comptroller.

In addition to the above work, the company has recently been awarded a contract for engineering and construction of new facllities on Phillips Petroleum Co.'s products line from Borger, Tex., to Chicago. The project is of high-priority status and will be built with all possible speed. Actual field operations have already begun and completion is anticipated early in 1952.

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Asbestos Pipe Line Felt is time tested and proven on the line. WHY EXPERIMENT?

Asbestos Pipe Line Felt has been continuously used since 1928 in Millwrap operations. This continued use of Asbestos Pipe Line Felt testifies to its ruggedness and protection of the enamel; its shipping endurance; and its all around superior performance.

NICOLET Asbestos Pipe Line Felt is an inorganic shield for the enamel insulation. This means that damage to the coating and pipe is stopped on the outside—before it starts. NICOLET Felt is saturated with the same basic bitumens as the coating.

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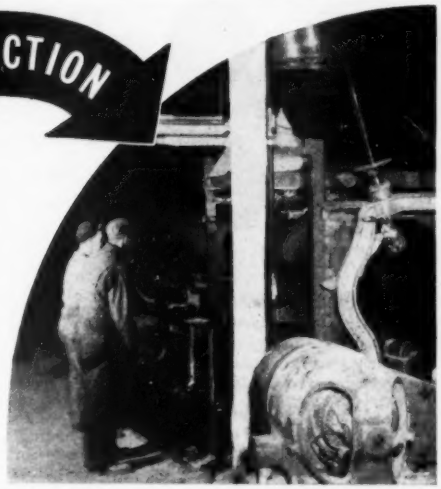

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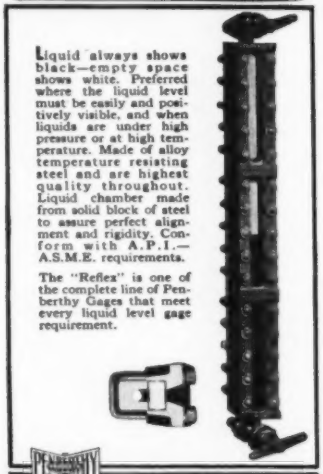

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REFINING

Ohio Oil to Expand

New, modified units to boost Robinson capacity

FINDLAY, Ohio.—Ohio Oil Co., headquarters in this city, will begin construction as soon as materials can be obtained on an expansion program which will raise capacity of its Robinson, Ill., refinery 33 per cent from 30,000 to 40,000 bbl. per day.

C. Z. Hardwick, manager of Ohio's refining and marketing department, said the program comprises construction of new units and modifications of existing facilities.

New units to be built include a 6,000-bbl. per day coking plant and a 7,000-bbl. per day catalytic-reforming unit. The plant's crude unit, fluid catalytic cracking plant, light-ends area, power house, and product-storage facilities will be added to and modified.

Ohio has received certificates of necessity from the Defense Production Administration authorizing quick tax-writeoff of a part of the cost of the new facilities. The construction is expected to take 18 months to complete.

The company also will build products terminals at Toledo, Ohio, and Mt. Vernon, Ind., which will receive products by pipe line from the Robinson refinery. The new terminals will supplement those already in operation at Indianapolis and Muncie, Ind., and Lima, Ohio.

A.P.I. Picks Frisco Site For 1952 Midyear Meeting

NEW YORK.—The seventeenth midyear meeting of the Division of Refining, American Petroleum Institute, will be held May 12-15, 1952, at the St. Francis Hotel in San Francisco. It will be the division's first midyear meeting on the West Coast.

Besides a full schedule of committee meetings, an elaborate technical program is being planned by the program committee headed by W. M. Holaday, director of Socony-Vacuum Laboratories, New York.

Technical sessions are tentatively planned on a number of basic refinery subjects. Offers will be approved at the next meeting of the program committee which is scheduled for the first week in November.

Subjects on which offers are being accepted and the committee to which they should be sent are as follows:

"Corrosion and Corrosion Prevention"—E. Q. Camp, Humble Oil & Refining Co., Box 3538, Baytown, Tex.

"Electrical Equipment"—L. M. Goldsmith, Atlantic Refining Co., 260 South Broad Street, Philadelphia 2, Pa.

"Analytical Research"—E. L. Baldeschwieler, Standard Oil Development Co., Box 51, Linden, N. J.

"Waste Disposal"—L. Mittelman, Tide Water Associated Oil Co., 79 New Montgomery Street, San Francisco, Calif.

"Training Personnel"—T. M. Rushing, The Texas Co., 135 East 42nd Street, New York 17, N. Y.

"Automotive Fuels and Lubricants"—T. B. Rendel, Shell Oil Co., 50 West 50th Street, New York 20, N. Y.

"New Refining Processes"—W. T. Gunn, American Petroleum Institute, 50 West 50th Street, New York 20, N. Y.

Phillips to Construct New Chemical Plant Near Houston

BARTLESVILLE, Okla.—Phillips Chemical Co., Phillips Petroleum Co. subsidiary, will begin construction of a large chemical plant on the Houston Ship Channel near Pasadena, Tex., as soon as necessary government approvals are issued.

The plant, an addition to the company's Adams terminal facilities, will produce chemical components used by synthetic-fiber manufacturers—principally special high-purity pyridines but including picolines, lutidines, and mixed pyridines. These will be marketed to manufacturers of pharmaceuticals, resins, dyestuffs, rubber chemicals, insecticides, and solvents.

The new Phillips unit will be built near the company's ammonium sulfate plant on the Todd Shipyard property purchased by Phillips from the Government in 1948. Completion is scheduled for June 1952.

Premier's New Platformer Supplying Company Plants

LONGVIEW, Tex.—Premier Petroleum Co.'s new 1,500-bbl. Platforming unit at Fort Worth is now supplying the company's four refineries at Longview, Fort Worth, Arp, and Baird, Tex., with platformed gasoline for delivery to all Premier dealers and Inreco stations.

First of its kind to be completed and operated in Texas, the new unit was started last October and placed in operation in late July.

Other new units planned for the company's Fort Worth plant include a 4,300-bbl. per day catalytic cracking unit and a 380-bbl. catalytic polymerization unit. The planned program will enlarge crude-processing capacity by 6,000 bbl. per day.

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Cotton Valley Solvents, New Refining Company, Organized

SHREVEPORT.—Cotton Valley Solvents, Inc., a new refining company, has been formed by a group headed by Jack Coast, general manager of Coast Oil Co.

The firm will engage in the refining of solvents, gasoline, kerosine, and diesel fuel.

Officers of the firm are Coast, president; Justin R. Querbes, vice president; and Isadore Lieber, secretary-treasurer. Querbes and Lieber are associated with the insurance firm of Querbes and Bourquin.

The new company, along with Coast Oil Co., will have its headquarters in the First National Bank Building here.

Treasury Gets $691 Million From Oil Taxes Last Year

WASHINGTON.—The Treasury received $691,232,000 from the three federal oil taxes during the fiscal year which ended June 30, an increase of nearly $68,000,000 over the preceding year.

Figures just issued by the Internal Revenue Bureau indicate an increase on the order of 50,000,000 bbl. in consumption of gasoline, taxed at the rate of 2 cents per gallon. Receipts from this tax were $569,048,000, an increase of $42,316,000 over the 1950 fiscal year.

Collections from the tax on lubricating oils increased $19,629,000 to $77,610,000 and receipts from pipeline transportation increased $6,027,000 to $24,946,000, the bureau reported.

Maintenance Show Set

The third annual Plant Maintenance Show will be held at Convention Hall, Philadelphia, on January 14-17, 1952. Held the first 2 years in Cleveland, the exposition is scheduled for Philadelphia next year to permit greater attendance from eastern industrial area.

The Plant Maintenance Conference, under the chairmanship of L. C. Morrow, consulting editor of Factory Management and Maintenance, will be held concurrently with the show.

Refinery Brief

Delta Refining Co., a subsidiary of Missouri Farmers Oil Association, has let a $1,800,000 contract for construction of a cat cracker and for additional storage capacity of 3,000,000 gal. at its Memphis refinery. The cracker is scheduled for completion early in 1952. It will increase refinery capacity 2,000 bbl. per day to a total of 6,000 bbl. daily.

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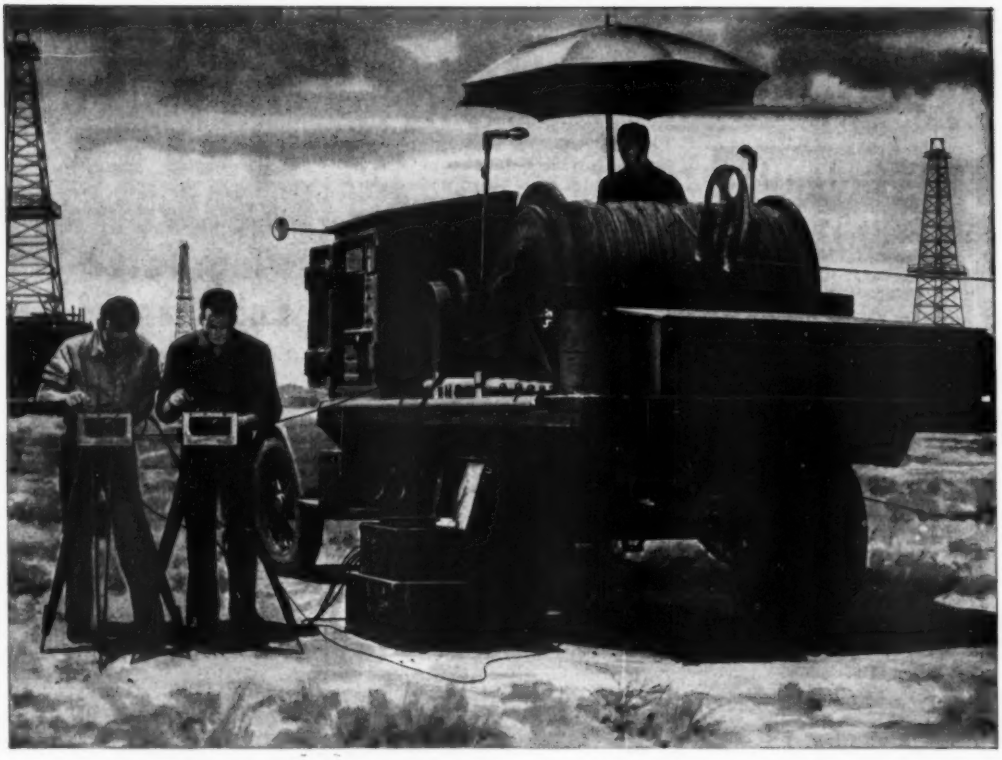

CHAPTER EIGHT in the Facinating Story of the Search for Oil

In 1938 The electrical well logging method, pioneered and developed by Conrad and Marcel Schlumberger as early as 1928, was thoroughly proved and accepted during its first decade of service, and by 1938 "a Schlumberger" had become synonymous with the search for new oil reserves.

"This method, which consists essentially in measuring the electrical resistivity and potential along the walls of a drill hole by introduction of a series of electrodes, not only gives exceedingly important information as to oil, gas and water content of formations penetrated, but also yields a log which, for correlation purposes, is often superior to any other type of log and which in specific cases may be of even greater utility than a complete core section," reported E. De Golyer in a lecture delivered at Princeton University in 1939.

The early electrical logs were plotted by hand, as pictured in this illustration of recording in California in 1932. Present day logs are recorded photographically on film and four or more curves can be recorded simultaneously on the same log.

1951... Since new and improved instruments are still the key to future progress in the endless search for new oil reserves, General maintains extensive instrument laboratories of its own to develop and improve dependable equipment to meet specific needs for various areas. In the hands of capable crews who are qualified by training and experience to accurately compile and interpret seismograph data, General instruments have helped many operators to determine and locate conditions favorable to finding new oil reserves. Let General's crews help you.

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Southern Saskatchewan Summary

WILDCATTING in the broad Moose Jaw syncline of southern Saskatchewan has suddenly jumped to proportions that foretell the early beginning of an interesting period for this province whose current daily production of only 3,300 bbl. of heavy oil belies its recognized potentialities.

There are now 18 active wildcat locations in Saskatchewan on scattered geophysical prospects. These wildcats, too many to detail on this page, are being drilled by Canadian and United States companies, individually and in various teams. The map shows the locations of these exploratory tests and also of wildcat failures completed in recent weeks.

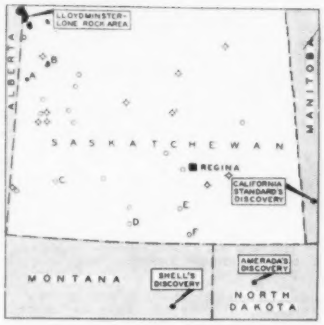
Geological and geophysical exploration work in southern Saskatchewan has been steadily increasing during the past 2 years. The seismograph is the most popular exploratory tool, there being over 20 crews in the area at the present time. Two gravity meters and two magnetometers (one airborne) are being employed.

The only oil that has been found in commercial quantities in Saskatchewan is in the Lloydminster area where oil has accumulated in localized areas in porous sand lenses in the upper part of Lower Cretaceous strata. Here heavy (10°-18°-gravity), black, asphaltic crude is produced from sands found above 2,000 ft.

At A on map is Hearts Hill where Albercan Corp. bailed heavy oil at the rate of 35 bbl. daily before operations were suspended last winter. The oil was found in a 42-ft. sand of Lower Cretaceous age at about 2,650 ft. This indicated discovery, located on the basis of gravity work, is scheduled for evaluation in the near future.

At B is Unity field, a 1944 discovery, where three Lower Cretaceous sands at about 2,000 ft. depth yield small volumes of gas.

Most of the wildcat locations shown on the map are relatively recent. Of special interest is Sohio Petroleum Co. 1 Wood Mountain at D. This wildcat is to be drilled with a rig capable of going to 15,000 ft., the largest in Saskatchewan. The 12,000 ft. of drill pipe on location indicates that this well is scheduled to make a thorough test of the Paleozoics. Sohio, as operator of an exploration program involving 11 million acres in Saskatchewan that is being conducted by several companies in partnership, has three other wildcats drilling, now all below 3,500 ft., and a fifth test starting.



Among the older drilling wildcats is Shell Oil Co. 1 Big Muddy Lake at F, a 10,000-ft. test now drilling below 6,841 ft. At E is another Shell wildcat, the 1 Dahinda, drilling below 4,093 ft. on a 6,500-ft. test.

Credited with recovering the first show of free light oil in the province is Socony-Vacuum Exploration Co.-Western Prairie Exploration Co. 1 Tompkins at C. This wildcat tested over 2,000 M.c.f. of gas per day on a drill-stem test near 3,650 ft. in the Hulett formation, a sandy limestone of Jurassic age found about 1,000 ft. above the top of the Devonian. This test, now drilling below 4,703 ft., is projected to the Ordovician expected at 6,500 ft.

In the Moose Jaw syncline are representatives of all the Paleozoic and Mesozoic systems except the Pennsylvanian, Permian, and Triassic. The potentialities of the Mississippian where it pinches out in the subsurface to the east and northeast have been indicated by California Standard Co.'s Manitoba discovery and "on structure" by Shell Oil Co.'s Montana strike. Devonian-age objectives in Saskatchewan have been enhanced by Amerada Petroleum Corp.'s discoveries in North Dakota. Socony-Vacuum's test has proved that reservoir beds exist in Jurassic rocks of the province and has increased interest in the possibility of locating oil-bearing stratigraphic traps within this system which unconformably overlies Mississippian rocks.

Philip C. Ingalls

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Tide Water 1 Dickenson, Martin County discovery, flowed 361 bbl. of oil in 20 hours on drill-stem test in the Ellenburger. Gage was through ⅝-in. bottom choke. Deep Rock 1 McWhorter, north of Stanton, kicked off and flowed 10 bbl. of Spraberry oil in 1 hour, then died.

SOUTHEAST NEW MEXICO.—The Texas Co. 1-AU State, 29-14s-32e, Lea County prospect, developed some 2,000 ft. of clean, 43°-gravity oil on drill-stem test of the Wolfcamp at 9,710-79 ft. Texaco 1-AR State, Devonian discovery in 2-11s-37e, made 38 bbl. of oil an hour on drill-stem test at 11,500-80 ft.

ROCKY MOUNTAIN AREA.—Shell Oil Co. is fighting lost circulation difficulties at its Richey area, Montana, wildcat after finding water with oil in the Mississippian.

SOUTH LOUISIANA.—Magnolia Petroleum Co. has opened new pay in its Ship Shoal Block 72 field, off Terrebonne Parish, in the open waters of the Gulf of Mexico. The well, B-2 State Lease 768, flowed 527 bbl. of 35.2°-gravity oil daily through perforations at 9,930-56 ft. . . . Sinclair Oil & Gas Co. 1 Turner Lumber Co., rank wildcat in southeastern Avoyelles Parish, had two Wilcox intervals with indications of gas-condensate pay. Shell Oil Co. broke its own producing depth record for the state. (See field report this week for details.)

Oklahoma

Garvin County Wildcat Gets Springer Showings

PROMISING oil and gas showings have been encountered by Vickers Petroleum Co., Inc., at its 1 Parks, SE NW SE 6-2n-3w, a wildcat location 6 miles north of Royal, and 3 miles west of the Panther Creek field, in Garvin County. Showings were in the Springer sand, top of which was logged at 9,689 ft. A drill-stem test with bottom of the hole at 9,703 ft. got a strong gas blow and filled 395 ft. of 34.6°-gravity oil and 360 ft. of oil and gas-cut mud which was recovered along with 1,000 ft. of water load, which was oil and gas cut. Tester was open 2 hours and gas was at the surface in 1 hour and 25 minutes. Flowing pressure ranged from 625 to 800 psi. Hole is being deepened to its 10,000-ft. objective before pipe is run.

The Texas Co. appears to have found a shallow Bromide sand pool 2 miles northeast of Madill, Marshall County, in the southern part of the state where its 1 Chapman, SW NW SE 35-4s-4e, flowed clean oil in drill-stem tests of the prospective pay zone. A drill-stem test in this sand at 917-27 ft. had gas at the surface in 2 minutes and started flowing oil in 19 minutes. Tester was open 40 minutes. Oil flow was estimated at 5 bbl. per hour and gas at 25,000 cu. ft. per day. Recovery in the breakdown was 150 ft. of oil, 10 ft. of oil-cut mud and 5 ft. of black sulfur water.

Another test, with hole deepened to 952 ft. and taking in an interval below 935 ft., had gas at the surface in 5 minutes and flowed oil at an estimated rate of 10 bbl. per hour, starting 40 minutes after the tool was open. Tester was open 60 minutes. Approximately 700 ft. of clean oil was recovered. At latest report hole was being cored ahead. Hole is projected to 3,500 ft. Nearest production is in the Madill pool, 6 miles to the southeast.

Pottawatomie County also has a prospective new pool where Herman Brown has run casing to test good showings encountered in second Wilcox sand at his 1 Walker, SW NE SW 18-7n-2e. Location is 4 miles south of the west Burnett pool and the same distance northwest of the one-well Trousdale pool. A drill-stem test of the sand at 6,132-46 ft. recovered 3,390 ft. of 40° oil with tester open 20 minutes. Hole was deepened to 6,149 ft. and casing run to 6,135 ft.

A new pay zone is indicated for the Doyle pool, in Stephens County. It is a sand, topped at 5,260 ft., approximately 200 ft. above the oolitic zone, the principal producing horizon in the area. The indicated discovery well is Murphy Oil Co. 7 Payne, SE SW SE 2-1n-5w. In a 60-minute drill-stem test of the top 38 ft. of the sand, it had gas at the surface within 4 minutes and flowed at an estimated rate of 2,000,000 cu. ft. per day. Final recovery was 4,400 ft. of oil and 30 ft. of oil-cut mud. The well unloaded as pipe was pulled. Gravity of the oil is approximately 42°. The sand has been logged in other wells in the areas but never has been so fully developed and has not been tested.

OKLAHOMA SUCCESSFUL WILDCATS

Logan County: Jordan 2 Carum, SE NW NW 33-16n-1w, flowed 114 bbl. 38°-gravity oil from Bartlesville at 5,252-74 ft., TD 5,844 ft., Oswego 5,016 ft., Hunton 5,450 ft., Sylvan 5,490 ft., Viola 5,600 ft., Wilcox 5,742 ft.

Oklahoma County: Josaline and Ashland 1 Haney, NE NE NW 19-13n-3w, flowed 12 bbl. oil from Bartlesville at 6,452-64 ft., TD 6,970 ft., OWWO, extension to W. Britton.

Seminole County: Flynn Oil 1 Best, NW NE NE 32-9n-7e, flowed 240 bbl. 40°-gravity oil from Booch at 3,392-3,419 ft., TD; Hogshooter 887 ft., Wewoka 1,567 ft., Red Fork 2,952 ft., Bartlesville 3,152 ft.

OKLAHOMA WILDCAT FAILURES

Choctaw County: Jordan 1 McCuiston, SW SW NE 12-6s-19e, dry, TD 563 ft.

Cleveland County: Davon Oil 1 McKiddy, SE SW NW 16-7n-1e, TD 6,157 ft.

Cotton County: Loggie 1 Hopkins, NE NE NE 25-4s-13w, dry, TD 1,950 ft.

Creek County: Yingling et al 1 Brown, NE NE NE 18-16n-8e, dry, TD 3,650 ft.

Garfield County: Fry et al 1 Remington, SE SE SW 33-22n-3w, dry, TD 2,286 ft.

Hughes County: Van Grisso and Republic Natural 1 Bilby, NE NE NW 17-6n-9e, dry, TD 4,091 ft.

Jefferson County: Hedge 1 Seay-37, NE NW NW 16-6s-5w, dry, TD 3,013 ft.

Davis-McMahon Drilling 1 Spring, SW SW SE 26-6s-6w, dry, TD 3,169 ft.

Nye 1 Trout, E SE SW 28-7s-7w, dry, TD 2,745 ft.

Kay County: Falcon-Seaboard Drilling B-1 Hardesty, SE NW NW 9-28n-4e, dry, TD 3,643 ft.

Lincoln County: Schafer 1 Brink, NW NW NW 6-12n-3e, dry, TD 5,631 ft.

Logan County: Peppers Refining 1 Teuscher, NW NE SW 30-15n-1w, dry, TD 6,252 ft.

Mohawk Drilling 1 Beland, NW SW SE 18-16n-1e, dry, TD 5,558 ft.

Murray County: Mohawk Drilling 1 Williams, SE SE SW 3-2s-3e, dry, TD 2,245 ft.

Okfuskee County: Foster 1 fee, SE SW NW 16-10n-10e, dry, TD 1,800 ft.

Oklahoma County: Peppers Refining 1 Menhusen, NW NW NE 4-13n-3w, dry, TD 6,446 ft.

Payne County: Foster Drilling 1 Goldie, SW SW SE 2-17n-4e, dry, TD 4,215 ft.

Stephens County: Seaboard Oil 1 Hurst, SW SW NW 28-1s-6w, dry, TD 6,916 ft.

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Kansas

Third Good Producer Indicated at Purdyville

THE recently opened Purdyville pool in Hodgeman County, western Kansas, has an indicated third good producer. Armer & Koplin 3 Schraeder, SW SW NE 3-24-24, filled 2,520 ft. with clean oil during a 60-minute drill-stem test of the pool's Mississippian pay zone at 4,686-93 ft. Top of the pay was logged at 4,673 ft. Casing has been run to 4,685 ft.

The new well is at a 10-acre location east of 2 Schraeder, the second producer, which, in turn, is a location east of the discovery well. Operators are starting the pool's fourth test, 4 Schraeder, a location northwest of the discovery well in the SE NW NW 3-24-24. The pool, the second for the county, was opened in April. No dry holes have been drilled.

Testing continues at Kingwood Oil Co. 1 Folkerts, SE SE SE 21-21-23, Hodgeman County wildcat and indicated discovery well of the county's third pool. The well swabbed 50 bbl. of oil and 33 bbl. of oil in 8 hours from perforations at 4,306-20 ft. in Marmaton lime. The latter perforations have been squeezed and casing reperforated at 4,309-14 ft. and at latest report formation was being acidized. In previous tests of open hole at 4,531-64 ft. in the Mississippian, the well swabbed 8 bbl. of oil and 36 bbl. of water in 12 hours. Location is 8½ miles northeast of Jetmore and 7 miles northeast of the Jetmore pool, first production in the county.

Atlantic Refining Co. has run casing to test oil and gas showings encountered in the Mississippian at its 1 Short, NE NE NE 14-23-8, 6 miles north of the Abbyville pool, Reno County. Hole was drilled to 4,095 ft. in Arbuckle lime without finding commercial showings below the Mississippian. A 60-minute drill-stem test in the latter zone at 3,656-62 ft. yielded 80 ft. of oil and gas-cut mud with 20 ft. of water. Casing was run through this interval to 3,747 ft.

Cities Service Oil Co. has completed its 1 Birket, 3 miles east of the Abbyville pool, in the SW SW SW 16-24-8, with a pump potential of 39 bbl. of net oil per day to open the Morton Southeast pool. Pay zone is in the Lansing-Kansas City section, opposite which casing is perforated at 3,423-35 ft. The well is ¾ mile southeast of the one-well Morton pool but is separated from that pool by a dry hole.

KANSAS SUCCESSFUL WILDCATS

Barton County: Petroleum, Inc. 1 Johnson, SE SE NW 9-17s-13w, pumped 401 bbl. oil from Heebner at 3,170-74 ft., TD 3,388 ft.

B&R et al 1 Johnson "B," SW SE NW 28-19s-12w, 297 bbl. oil from Lansing-Kansas City at 3,305-10 ft., TD 3,403 ft.

GMR 1 Johnson "B," SW SW SW 28-19s-12w, pumped 487 bbl. oil from Arbuckle at 3,381-89 ft., TD.

Cowley County: Wiedemann 1 Lee, NW NE SW 16-30s-7e, pumped 15 bbl. oil from Mississippi lime at 2,890-2,917 ft., TD.

Kingman County: Lion 1 Smalley, NW NW NE 25-27s-10w, flowed 28 bbl. oil from Mississippi lime at 4,002-10 ft., TD 4,281 ft., new zone in Dresden.

Russell County: Shumaker-Meyers 1 Ehrlich, NW NW SE 7-14s-13w, pumped 12 bbl. oil from Tarkio at 2,383-93 ft., TD 2,410 ft.

Sedgewick County: Gaty 1 Lvening, CSL NW SE 33-26s-2e, pumped 25 bbl. oil from Simpson at 3,338-42 ft., TD 3,372 ft.

KANSAS WILDCAT FAILURES

Barton County: Armer 1 McIlwaine, SE SE NW 20-17s-13w, dry, TD 3,441 ft.

Hartman 2 Gaunt, SE SE SE 3-20s-13w, dry, TD 3,477 ft.

Ellis County: Honaker 1 Craig, NW NE NW 9-11s-16w, dry, TD 3,560 ft.

Phillips 1 Herman, SE SE NW 15-12s-17w, dry, TD 3,712 ft.

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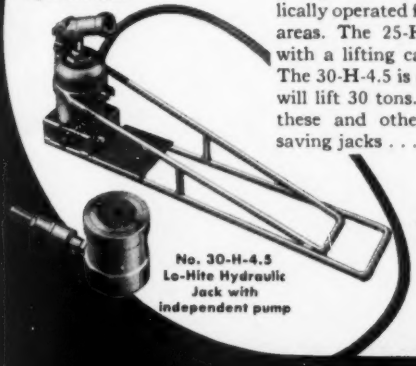

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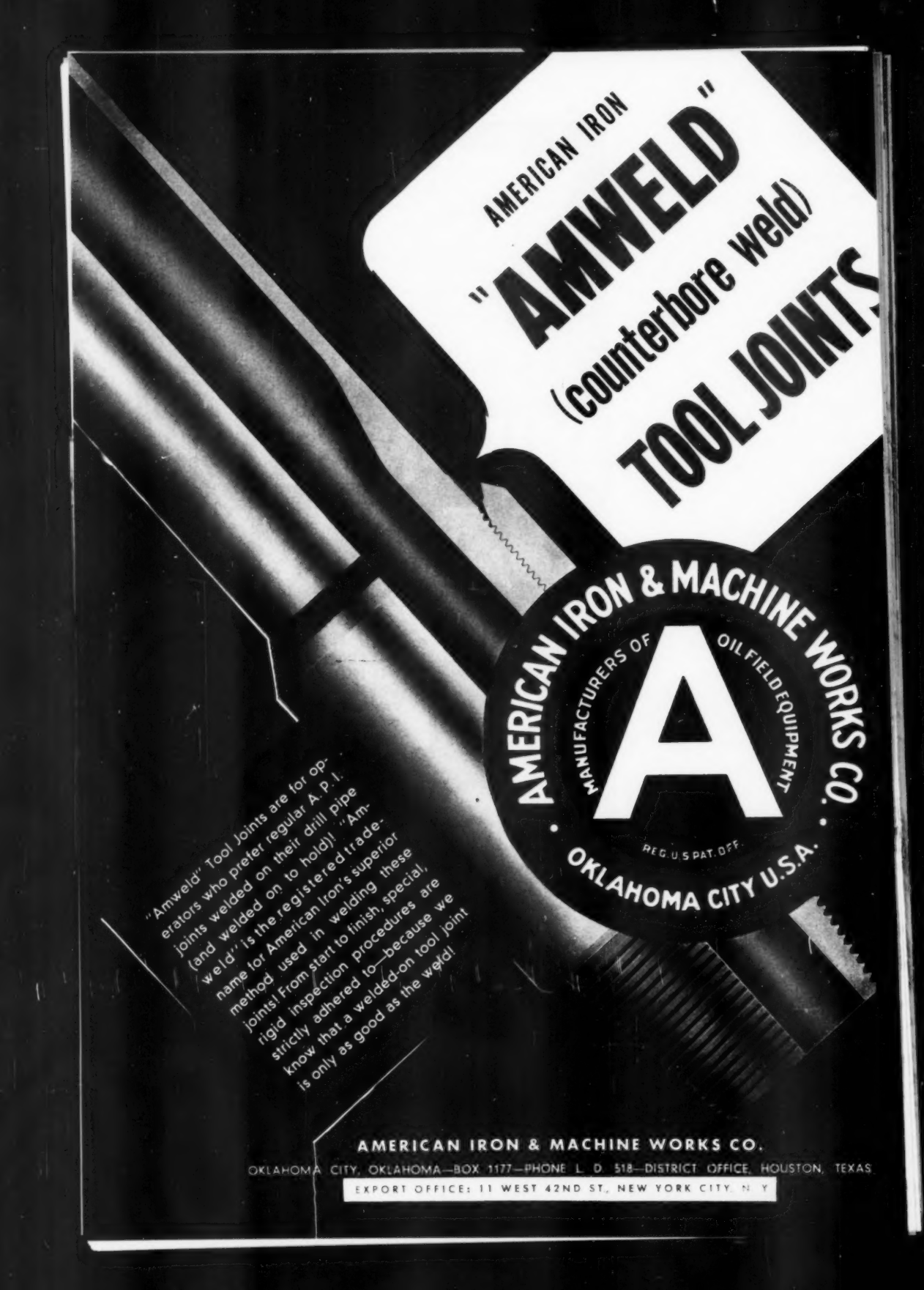
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Rine et al 1 Bemis, SE SE NW 33-13s-19w, dry, TD 3,976 ft.

Graham County: Musgrove 1 LaCrete, NW NW SW 31-6s-22w, dry, TD 3,990 ft.
Zoller 1 Ford, NW NW NE 29-9s-21w, dry, TD 3,980 ft.

Greenwood County: Gary 1 French, NE SW NW 1-22s-12e, dry, TD 1,861 ft.
Scanlon & Dillard 1 Berry, SW SE SE 34-23s-13e, dry, TD 1,844 ft.
Morris & Stryker 1 Ross, SW SE SW 11-27s-12e, dry, TD 1,093 ft.

Hodgeman County: Lauck 1 Sturgeon, NE SW NE 35-23s-24w, dry, TD 4,825 ft.

Kingman County: Wakefield 1 Moorhouse, SE SE SE 6-29s-5w, dry, TD 4,439 ft.

Ness County: Flynn 1 Petersilie, SW SW SW 11-20s-24w, dry, TD 4,510 ft.

Osage County: Perrell 1 Ramage, SW SE SE 21-18s-17e, dry, TD 1,490 ft.

Rooks County: Barnett 1 Steeples, SW SW NE 36-9s-20w, dry, TD 3,915 ft.

Russell County: Johnston 1 Brandt, NW NW NE 14-12s-15w, dry, TD 3,310 ft.
Pierce et al 1 Boxberger, SE SW NE 5-14s-14w, dry, TD 3,343 ft.

Stafford County: El Dorado 1 O'Conner, NE NE SE 8-24s-12w, dry, TD 3,914 ft.
Aylward 1 McCune, NE NE NE 18-25s-12w, dry, TD 4,210 ft.
Hilton 1 Cornwell, SE SE NW 31-23s-13w, dry, TD 3,902 ft.

Woodson County: Aikman & Branden 3 Mulsow, NE NE SE 3-24s-14e, dry, TD 1,702 ft.

Eastern Texas

Grayson County Discovery Drills to Test Deeper Zones

DALLAS.—George W. Humphrey 1 Barnes, Grayson County Oil Creek discovery east of the Sandusky area, was drilling ahead to explore the lower formations. At last report the well had recovered 847 ft. of distillate and gas-cut mud on a 44-minute test between 10,274-89 ft. Formation being tested was not identified. A previous test at 10,244-69 ft. flowed gas and distillate with gas volume estimated up to 15,000,000 cu. ft. daily.

A third producer for the new area 6 miles south of Sandusky was completed by Sinclair Oil & Gas Co. at its 1 Barnes. Pump completion potential was 213 bbl. of 36°-gravity oil from pay at 3,483 ft.

Mid-Continent Petroleum Corp. 1 Coleman, wildcat 6 miles west of Hagerman, was drilling in shale at 6,264 ft. The same operator's 1 Susie Martin, 6 miles northeast of Whitesboro, was drilling shale at 1,604 ft.

Humble Oil & Refining Co. 1 Fred Marberry, Freestone County wildcat northeast of Kirvin, logged oil and gas shows in the Pettit limestone, then recovered 335 ft. of gas and oil-cut mud on a 20-minute drill-stem test from 6,940-70 ft. The well previously had gas shows in the Rodessa.

The Texas Co. 1 Hanks, Anderson County wildcat west of Fosterville, was running electrical surveys at 10,500 ft. Free oil was recovered in the Pettit at 10,435-475 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

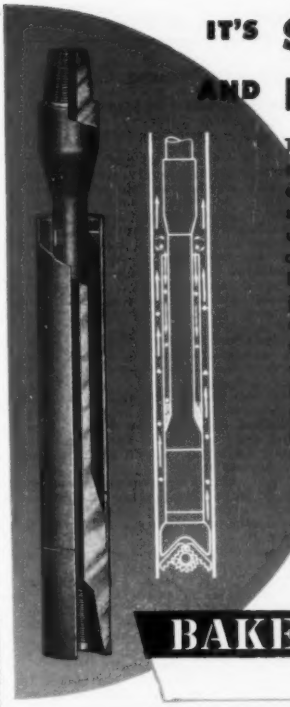
Anderson County: Lewis-Miers Drilling Co. 1 Southern Pine, F. Daniels Sur., dry, TD 5,210 ft.

Henderson County: W. P. Luse 1 L. P. Hall, J. D. Pierson Sur., dry, TD 4,513 ft.

McLean County: M. S. Kemmerer 1 Eula Holt, R. Simpson Sur., dry, TD 3,302 ft.

Navarro County: Brown & Wheeler 1 M. Henderson, D. R. Dunham Sur., dry, TD 7,233 ft., elev. 283 ft., Rodessa 3,735 ft., Goodland 4,915 ft., Paluxy 5,075 ft., James 6,725 ft.

Smith County: Pure Oil Co. 1 E. M. Brown, A. Wright Sur., dry, TD 4,380 ft.



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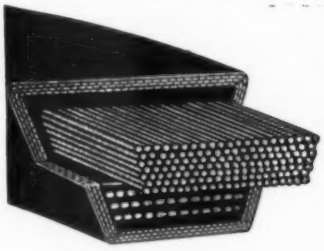

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North Central Texas

Southwest Young County Has Strawn Prospect

WICHITA FALLS.—R. H. Seigfried Co. 1 Allar Co., 5 miles east of Murray in southwest Young County, had prospects of discovery production from what was believed to be Strawn limestone. The well flowed 33 bbl. of oil in 12 hours from pay at 3,493-3,506 ft., total depth. Location is ½ mile south of an old shallow area and about 1½ miles west of Caddo pay.

Montague County gained a new deep test as Tom B. Medders and J. Newton Huff 1 Reynolds, located 4 miles south of Mallard in the B. H. Anderson Survey. Contract depth is 6,600 ft.

Wichita River Oil Co. has contracted to drill a 6,000-ft. test 2½ miles north of Bonita in the MEP&P Survey 54, as the 1 M. M. Gilbert.

High completion potential was reported for Tom Medders 1 M. W. Wells, in the Richardson area. Flowing through 32/64-in. choke, the well gaged 620.5 bbl. of 42°-gravity oil a day. Caddo pay was logged from 6,061-65 ft.

A new wildcat location for Clay County is A. D. McDuffie's 1-A Lone Star Gas Co., in the Parker County School Survey, 2½ miles southeast of Petrolia. Projected depth is 2,000 ft.

Shackelford County had prospects of shallow discovery production at J. G. McMillan 1 G. R. Davis, 6-13-T&P, and 7 miles southeast of Lueders. The well had top of the Bluff Creek at 1,624 ft., and at 1,642 ft. the hole had filled with oil. Operators set casing on top of the pay for completion. Nearest production from that zone is 3 miles to the northeast.

Magnolia Petroleum Co. has staked its 2 Elma Jackson as a southeast offset to its new Ellenburger discovery in Callahan County, 5 miles north of Baird. The second well will test shallow shows of oil which were logged in the discovery.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: T. V. Gorman 1 F. L. Kelley, TE&L Sur. 158, Olney townsite, TD 3,043 ft., pay 3,038 ft., pumped 120 bbl. oil.

Clay County: Frank Wood 1 Troy Douthitt, Parker CSL, A-374, TD 1,806 ft., pay 1,798 ft., pumped 19 bbl. 44°-gravity oil.

Cooke County: T. P. Frost 3 E. G. Ramsey, B. Lusk Sur., A-569, TD 1,440 ft., pay 1,416 ft., pumped 5 bbl. oil.

Eastland County: Intex Oil Co. 1 J. A. Pippin, Sec. 3,182f TE&L, TD 4,170 ft., pay 3,650 ft., flowed 24 bbl. 37°-gravity oil, ¾-in. choke, TP 40 psi.

Jones County: Humble Oil & Refining Co. 1 Mrs. Amy Sears, 28-2-SPRR, TD 3,024 ft., elev. 1,773 ft., sand pay 3,012 ft., flowed 235 bbl. 44°-gravity oil, 18/64-in. choke, TP 120 psi., GOR 558 cu. ft.

Shackelford County: G. E. Kadane & Sons 1 V. A. Reames, Sec. 26, BAL Sur., TD 3,050 ft., pay sand 3,040 ft., pumped 24 bbl. oil.

Throckmorton County: R-G Drilling Co. 1 N. L. B. Davis, TE&L Sur. 1,620, TD 4,163 ft., elev. 1,367 ft., Strawn sand 3,355-63 ft., pumped 33 bbl. 40°-gravity oil.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: R. W. Darden 2-A Estill, Sec. 2,434, TE&L, dry, TD 1,442 ft.
W. H. McClusky 1 Abercrombie, 97-4-Clark & Plumb, dry, TD 1,250 ft.
R. Clay Underwood 1 Jones & Cullum, Blk. 2, SPRR Sur. 2, dry, TD 1,805 ft.

Brown County: Creslenn Oil Co. 1 Bowden, A. White Sur. 161, A-942, dry, TD 2,059 ft., elev. 1,590 ft., Fry 1,820 ft.
McLean-Roberts 1-F Cox & McInnis, Sec. 26, Osborne Dalton Sur., dry, TD 1,250 ft.

Callahan County: M. H. Crabb 1 Hill, Robert Henderson Sur., dry, TD 1,623 ft.
H. W. Lee et al 1 Hooks est., 91-13-T&P, dry, TD 1,850 ft.
Mid-Continent Petroleum Corp., 2 A. J. Stevenson, 3-8-SPRR, dry, TD 4,840 ft., elev. 1,830 ft., Caddo 4,395 ft., Ellenburger 4,760 ft.

Clay County: J. J. Lynn 1 S. C. Matlock, Sec. 2,645, TE&L, dry, TD 4,145 ft.

Coleman County: Anzac Oil Corp. et al 2 C. A. Jamison, Sec. 152, J. L. Bouldin Sur., dry, TD 1,995 ft., elev. 1,539 ft., Winchell 1,145 ft.
Louis Egan 1 R. G. Hipsher, 57-5-Coleman CSL, dry, TD 1,004 ft.
W. J. Murray et al 1 E. Hamon, Jr., J. L. Clayton Sur. 28, dry, TD 3,487 ft., elev. 2,025 ft., Capps 3,090 ft., Gardner 3,332 ft.

Comanche County: John W. Hood 1 Ewell Ward, James Madison Sur. 40, dry, TD 2,766 ft., elev. 1,483 ft., Mississippi 2,726-56 ft., Ellenburger 2,756 ft.
Ralph Schneider 1 A. Roberson, J. R. Stephens Sur., dry, TD 900 ft.

Cooke County: Russell & Russell 2 Inglish, R. Findley Sur. 377, dry, TD 1,818 ft.
Sun Oil Co. 1 D. L. Monroe, D. C. Wheeler Sur., dry, TD 5,900 ft.

Denton County: Hunt & Sands 2 H. E. Long, B. A. Way Sur., dry, TD 1,966 ft.

Eastland County: J. W. Hastings 1 V. H. May, 3-4-H&TC, dry, TD 1,516 ft.
Ben J. Weinberg 1 Cecil Alford, Sec. 39, McLennan CSL, dry, TD 1,373 ft.

Foard County: American Liberty Oil Co. 1 D. B. Traweek, 87-44-H&TC, dry, TD 6,589 ft., elev. 1,542 ft., Ellenburger 6,509 ft.
G. E. Kadane & Sons 1-B Minnick, 84-B-H&TC, dry, TD 5,315 ft.

Haskell County: Gem Oil Co. 1 C. J. Kleiner, T. G. Box Sur. 54, dry, TD 5,523 ft., elev. 1,430 ft., Caddo 5,015 ft., Mississippian 5,288 ft., Ellenburger 5,496 ft.

Jack County: Cabot Carbon Co. 1-A J. A. Birdwell, A. Adams Sur., dry, TD 4,050 ft.
Russell Maguire 2-A Richards, T. P. Kuykendall Sur., dry, TD 5,400 ft.
Denzil Morrow 1 J. W. Maxey, Blk. 2, SPRR, dry, TD 616 ft.

Jones County: Great Lakes Carbon Corp. 1 R. I. McElroy, Sec. 51, D&DAL, dry, TD 2,350 ft., Tannehill 2,095 ft., Flippen 2,248 ft.
Grisham-Hunter Corp. 1 T. J. Pierce, 102-1-BBB&C, dry, TD 3,114 ft.
The Texas Co. 2 Anderson, Sec. 23, HT&B, dry, TD 2,900 ft., Flippen 1,780 ft., Swastika 2,075 ft., reef 2,813 ft.

Knox County: Christie Hewitt Estate of J. R. Dougherty 1 W. S. Davis, R. H. Hunter Sur., dry, TD 6,132 ft., Canyon 3,503 ft., Caddo 5,546 ft., Ellenburger 6,076 ft.

Montague County: F. W. Cooper 1 Reeves, P. Miller Sur., dry, TD 5,667 ft.
Harvey Drilling Co. 1-D Edde Howard, Blk. 59, Kaufman CSL, dry, TD 3,593 ft.

Nolan County: D. D. Feldman 1 H. B. Cook, 173-1A-H&TC, dry, TD 7,200 ft., elev. 2,580 ft., Strawn 6,230 ft., Caddo 6,680 ft., Ellenburger 7,018 ft.

Shackelford County: Horace E. White 1

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Oma Townsend, Sec 46, LAL Sur., dry, TD 2,235 ft.

Stonewall County: DeSoto Oil Co. 1 E. V. Smith, 110-D-H&TC, dry, TD 6,355 ft., elev. 1,716 ft., Swastika 3,835 ft.

S. D. Johnson 1 A. Brinkley, 6-9-AB&M, dry, TD 6,500 ft., elev. 1,705 ft., Caddo 5,882 ft., Ellenburger 6,342 ft.

Throckmorton County: Anderson & Word 1 Unit 5 W. R. Matthews, J. Tevis Sur., dry, TD 1,485 ft.

Wichita County: W. G. Gouchie 1 A. G. Reis, Blk. 196, Waggoner CSL, dry, TD 1,760 ft.

Frank Wood 1 Ed Foster, Sec. 1, SA&MG Sur., dry, TD 2,132 ft.

Young County: Neeld & Hood Drilling Co. 1 E. R. Prideaux, CTRR Sur. 1, dry, TD 3,154 ft.

Appalachian-Ohio

West Virginia Wildcat Gets Gas in Preston County

PITTSBURGH.—In Portland district, Preston County, West Virginia, Hope Natural Gas Co., 9637 Margaret C. Kraus, wildcat, elevation 2,247 ft., had a final open flow of 6,000,000 cu. ft. of gas. Chert was logged at 4,971 ft.; gas 4,980-85 ft., Oriskany sand 5,146 ft.; gas 5,146, 5,342, and 5,346 ft. Total depth was 5,348 ft.

Magnolia district, Mingo County, Columbian Carbon Co., 1-GW-1165 Red Jacket Coal Corp. completed for 13,047,000 cu. ft. gas in the Big lime, total depth 3,340 ft.

Kermit district, United Fuel Gas Co., 6701 Burning Creek Marrowbone Land Co. completed for 1,320,000 cu. ft. gas in Brown shale at total depth of 3,070 ft.

Grant district, Wayne County, United Fuel Gas Co., 6956 fee gaged 1,192,000 cu. ft. gas in Brown shale at total depth of 3,483 ft. The same company's 6,744 fee gaged 1,841,000 cu. ft. gas in Big lime at a total depth of 1,865 ft.

In Garrett County, Maryland, Eberly & Snee, 1 Eli Beechie, elevation 2,437 ft., is drilling at 4,095 ft. The chert was reached at 4,007 ft. Mathews & Gooseman, 1 M. L. Calhoun, elevation 2,431 ft., recorded the Tully lime at 3,540 ft. and is drilling at 3,684 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Preston County, Portland district: Hope Natural Gas Co., 9637 Margaret C. Kraus, elev. 2,247 ft., IP 6,000,000 cu. ft. of gas, open flow, chert 4,971 ft., gas 4,980-85 ft., Oriskany sand 5,146 ft., gas 5,146, 5,342, and 5,346 ft., TD 5,348 ft.

OHIO

COLUMBUS.—Palmer et al. extended the Clark Township, Coshocton County, pool ½ mile to the north with a gas well on 1 Badertscher, Lot 24. The Clinton sand at 3,213-32 ft. gaged 1,000,000 cu. ft. of gas natural, but did not respond to the shot, and shut in at the same volume.

Ohio Fuel Co. 1 T. D. Martin, Section 19, Knox Township, Holmes County, found two pays in the Oriskany that totaled 1,100,000 cu. ft. of gas, natural. The sand, logged at 4,928-75 ft., produced only small amounts of gas in the other wells drilled in this pool, which have been completed in the Newburg or Clinton.

Clinton Oil Co. 3 Ed Hickey, Section 9, Hopewell Township, Licking County, came in with a good show of oil in the Clinton at 3,059-94 ft., and made 67 bbl. in 24 hours after a 120-qt. shot.

In Berea field in Perry Township, Ashland County, Robinson et al. found a thick Berea pay in the 1 Maude Grady, Section 4. After shooting the sand at 667-75 ft., the producer made 65 bbl. of oil in 24 hours.

OHIO SUCCESSFUL WILDCAT

Richland County, Troy Township: E. C. McManaway et al. 1 K. J. Cockley, Section

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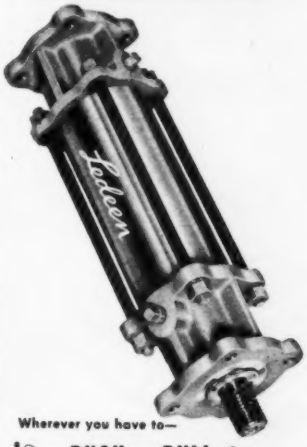

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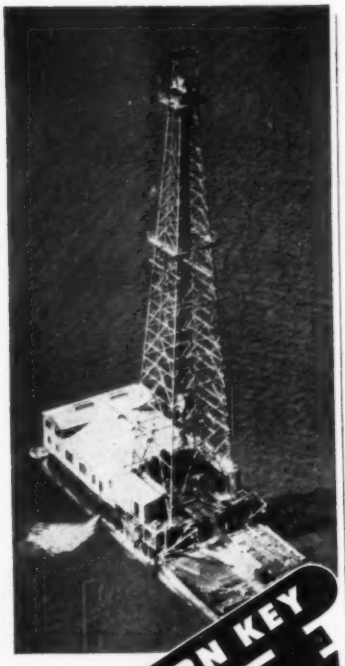

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13, Clinton 2,138-46 ft., 105,000 cu. ft. gas, TD 2,218 ft.

OHIO WILDCAT FAILURE

Columbiana County, Salem Township: Manufacturers Light & Heat 2 Halvestadt, Sec. 36, Clinton 5,959-6,085 ft., TD 6,193 ft.

California

Wildcat Activity Increases After Slight Lull in July

LOS ANGELES—Exploratory drilling in California after a slight lull in July again has increased in tempo. Like development drilling, wildcatting is very widely scattered with the most active areas being Cuyama Valley and upper Santa Clara Valley in the vicinity of Castaic.

In Cuyama seven wildcats were under way of which five were being drilled by Richfield Oil Corp. The other two were Humble Oil & Refining Co.'s test in the mountains north of Morales Canyon and Trans-Oceanic Oil Corp.'s 1 Mackie located 3 miles north of Russell Ranch production. The former was drilling below 2,100 ft. while the latter was nearing 7,000 ft.

Of the Richfield wildcats probably the one most closely watched was 1 J. G. James in Section 9-9n-26w, about 1½ miles southeast of South Cuyama. Scheduled to be drilled to about 12,000 ft., the wildcat at the week end was nearing 7,800 ft. At the last reported depth, 7,776 ft., it had not yet picked up the top of the Hibberd sand, its primary objective. Richfield 35-5 Cox in Section 5, nearest Hibberd producer, found the sand at about 5,850 ft.

Richfield was preparing to leave its 2 Caliente Unit in Section 13-10n-25w on the southeast end of the valley after reaching 2,734 ft. Signal Oil & Gas Co. left its 1 Signal-Harrington in Section 24-11n-28w, after reaching 6,101 ft. Sloan Oil Co. staked location for a wildcat, 54 "Well," in Section 23-11n-28w, northwest of Russell Ranch production.

In the Castaic area of Los Angeles County, Humble was attempting to establish shallow production at two wildcats northwest of Saugus. Located in Section 9-4n-16w, the two tests were D-1 and D-2 Newhall Land & Farming Co. The former had been drilled to 8,766 ft.

At Loma Verde in Section 29-5n-17w, Trigood Oil Co. was drilling below 4,700 ft. at 2 Ayala, while in Section 35 Ted Sterling was drilling near 800 ft. at 1 Rynne-Fisher.

In Section 19-5n-16w George Allen was preparing to deepen 1 Allen from 1,802 ft., and in Section 8-4n-16w Superior Oil Co. was drilling below 6,277 ft. at 1 Newhall Land & Farming.

In Honor Rancho field, The Texas Co. was attempting to complete 4 Honor Rancho in either a new deeper-pay zone or a new fault block. Located in Section 6-4n-16w the potential extensioner was bottomed at 10,086 ft. with 5½-in. casing cemented at 10,074 ft., and tubing hung at 9,157 ft.

In the Princeton area of Butte County, northern Sacramento Valley, Honolulu Oil Corp. was in the process of completing its 1 Honolulu-Humble-Wild Goose as a new gas field discovery. Located in Section 17-17n-1e or about 7 miles northeast of the Colusa gas field, the wildcat flowed at the rate of 3,500 M.c.f. daily through perforations at 3,292-3,314 ft. The company was preparing to drill a second well about 1½ miles east, in NE NE Section 18.

About 2 miles southeast of the North Belridge field in San Joaquin Valley, Independent Exploration Co. was attempting to complete its 2 E-P U.S.L. as a Buttonbed sand discovery. Encountering this sand at 450-550 ft., 5½-in. perforated liner was landed at 682 ft. after drilling to 1,074 ft. total depth. Pumping equipment was being installed at last reports.

CALIFORNIA WILDCAT FAILURES

Kern County, Race Track Hill area: Richard S. Rheem 2 Portals, 3-30s-19e, dry, TD 3,150 ft., elev. 676 ft.

Tejon Hills area: J. F. Kosanke K-5-14 "Well," 14-11n-18w, dry, TD 360 ft., elev. 1,089 ft.

Sacramento County, Isleton-NE area: The Texas Co. 1 J. S. Brown (NCT-1), 11-4n-4e, dry, TD 4,100 ft., elev. 10 ft.

San Joaquin County, McDonald Island gas field area: William L. Rawn 1 Mildred Island, 26-2n-4e, dry, TD 5,801 ft., elev. 6 ft.

San Mateo County, Pescadero area: The Texas Co. 1 Mattei Estate, 34-7s-5w, dry, TD 5,813 ft., elev. 196 ft.

San Luis Obispo County, Carrizo Plains area: The Texas Co. 1 Santa Margarita Land & Cattle Co.-NCT, 2-32s-19e, dry, TD 6,003 ft., elev. 2,837 ft.

Cuyama Valley area: Signal Oil & Gas

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Co. 1 Signal Harrington, 24-11n-28w, dry, TD 6,101 ft., elev. 3,005 ft.

Santa Barbara County, Cuyama Valley area: Richfield Oil Corp. 88-34 E. M. Elliott, 34-10n-27w, dry, TD 6,030 ft., elev. 2,807 ft.

Rocky Mountain

Two More Discoveries For Julesburg Basin

DENVER.—Two new wells in the Denver-Julesburg basin, extending the general productive areas of current discovery pools, have logged saturation and may be productive.

Brown Drilling Co. of Los Angeles recovered oil and salt water on drill-stem test of the D sand at an Ohio farmout northeast of Gurley pool, Cheyenne County, Nebraska. This is Brown's second wildcat in the current play. The well is 1 Scheeler, NE SE NE 11-16n-48w, and top of the D sand was logged at 4,157 ft. The test was made between 4,157-67 ft. and on the 1-hour test the recovery was 927 ft. of oil and 930 ft. of salt water. Brown is now drilling below 4,196 ft. for a test of the G and J sands (Graneros-Dakota series). The wildcat is of importance as the first of several drilled in this general area, northeast of Gurley, to find oil. Ohio had done seismic work on the block.

In Weld County, Colorado, Wycolo Development Co. of Cheyenne found saturation in cores of the Dakota and are running casing for tests of the zone. The operator reports the sand is well saturated. The well is at 7,403 ft., total depth, and the casing will be run through the sand and perforated for completion tests. This wildcat is located in the C SE 4-9n-61w, 15 miles northwest of the closest producing field and west of fields discovered in the current exploratory play through this basin.

Shell Oil Co. recovered an unreported volume of water with oil on tests following deepening the important Williston basin, Montana, wildcat. The well is 1 Northern Pacific, SE NW NW 19-23n-50e, in the Richey area, Dawson County, and flowed oil on tests of the zone 7,183-7,253 ft. Shell cored to 7,296 ft., and reports from the area indicate the well flowed at the rate of 350 bbl. of fluid per hour with 5 per cent oil and the balance water. Shell is now cementing for lost circulation with the well at 7,308 ft. Unofficial reports from Montana now credit Shell with plans for drilling to the Devonian—productive 135 miles northeast at Amerada Petroleum Corp.'s Nesson-Beaver Lodge, North Dakota discovery. Shell has not announced how deep the well may now be drilled.

Seven-inch casing has been cemented at 7,183 ft. Production from the upper zone is now believed by some to be from upper Mississippian, the Charles formation, leaving possible producing formations as objectives for the well. Shell has announced no formation tops for the discovery, but is believed to have a commercial producer in the upper zone. This wildcat started an extensive leasing program throughout all of eastern Montana, with leasing now extending southward into the upper portion of the Powder River basin.

MONTANA WILDCAT SUCCESS

Fish Creek, Natrona County: Atlantic Refining Co. 2 Government, SW NE NE 8-31n-84w, TD 1,298 ft., PB 1,245 ft., gaged 972 M.c.f. gas per day. Cloverly 970 ft., Lakota 993 ft., Morrison 1,034 ft.

COLORADO WILDCAT FAILURES

South Fort Morgan, Morgan County: Chapman & Dee 1 Huey Moreland, NW NE NW 12-1n-57w, TD 5,455 ft., dry. Niobrara 4,492 ft., Timpas 4,900 ft., "D" sand 5,343 ft., "J" sand 5,398 ft.

Wildcat, Yuma County: Jack Manning 1 Jewell, NE NW NE 32-2n-48w, dry, TD 4,094 ft., "D" sand 3,683 ft., "J" sand 3,757 ft., Skull Creek 3,864 ft., Cloverly 3,964 ft.

UTAH WILDCAT SUCCESS

Duchesne Unit, Duchesne County: Carter Oil Co. 1 Ute Tribal, C SE NE 17-4s-4w, TD 7,596 ft., flowed 143 bbl. oil in 24 hours, 42.9° gravity.

UTAH WILDCAT FAILURE

Vernal, Uintah County: Carter Oil Co. 1 Rockwood Brown, C NE SW 5-5s-20e, TD 10,714 ft., dry.

South Louisiana

Avoyelles Rank Wildcat Finds Deep Wilcox Pay

NEW ORLEANS.—A deep Wilcox discovery is indicated in rank wildcat territory in the extreme southeast corner of Avoyelles Parish. Sinclair Oil & Gas Co. 1 Turner Lumber Co., SW NE 29-2s-6e, cored at 11,724-69½ ft. in the Wilcox, and the entire 45½-ft. section had porosity, fluorescence, and good odor. It was indicated that the sand would produce gas and condensate. Another sand was cored at 11,811-29½ ft., and had indications that it would produce gas and condensate, and possibly oil from the bottom 3 or 4 ft.

Operators are currently running electric log to total depth of 11,902 ft. A MicroLog will be run after completion of this, and casing will be set on bottom. Drilling will then be resumed until the venture reaches the 13,000-ft. contract depth. If no further showings are encountered, the well will be plugged back for production tests in the indicated sands.

This prospective discovery is 21 miles

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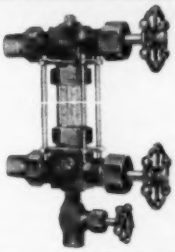

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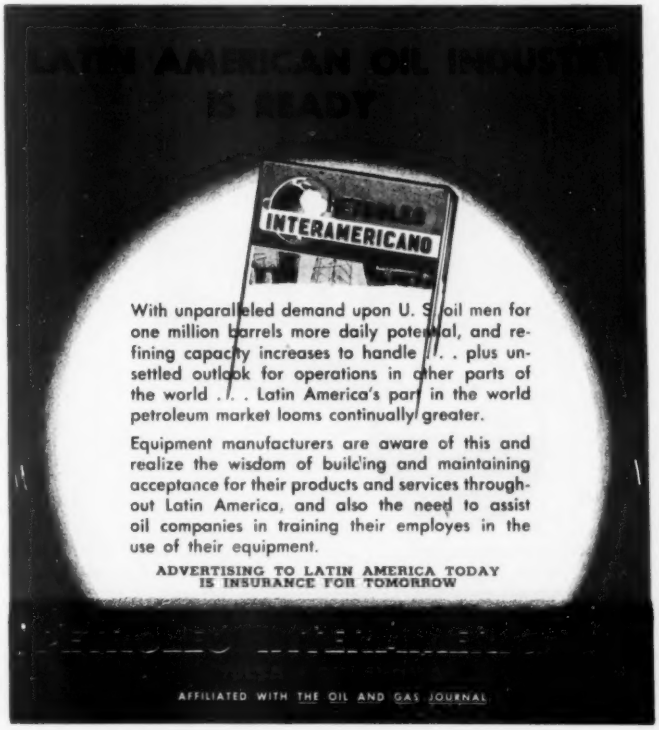

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east-southeast of Eola field, Avoyelles Parish, which produces from the Wilcox at 8,500 ft., and is also 24 miles north-northwest of Krotz Springs field, St. Landry Parish.

Shell Oil Co. has established a new producing depth record for the state at 1 H. T. Gonsoulin, in Weeks Island field, Iberia Parish. The well flowed 466 bbl. of 33°-gravity oil daily through perforations at 15,296-15,336 ft. Gage was made through 10/64-in. choke. This well previously indicated it would set a new world's record when it flowed 188 bbl. of oil daily from perforations at 16,572-16,600 ft. Another Shell well in Weeks Island formerly held the record: 2 Weeks Gail State Unit produces from 15,138-48 ft.

New deep pay has been established in Fausse Point field, Iberia Parish, at The Texas Co. 6 Kling-Walet, 21-11s-8e. The well flowed 468 bbl. of 36.4°-gravity oil daily through 10/64-in. choke on potential test. Abnormally high pressures were encountered in the well when operators perforated from 14,180-94 ft. On initial test, the well developed a tubing pressure of 8,000 psi. when opened on 14/64-in. choke. Operators reperforated at 14,198-14,200 ft., total depth, and the well flowed under tubing pressure of 5,200 psi.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Acadia Parish: Bates and Cornell 1 Mrs L. E. Frey, 31-7s-1e, TD 10,143 ft., perf. 9,650-56 ft. and 9,438-46 ft., 210 bbl. oil, 9/64-in. choke, TD 850 psi., gravity 24.8°.

Lafourche Parish: Humble Oil & Refining Co. 1 LI&E "C," 30-19s-23e, TD 13,387 ft., perf. 9,166-69 ft., 269 bbl. condensate, ⅛-in. choke, gravity, 57°.

Terrebonne Parish: New pay at Ship Shoal Block 72—Magnolia Petroleum Co. B-2 State Lease 768, offshore, TD 11,150 ft., perf. 9,932-56 ft., 527 bbl. oil, 12/64-in. choke, gravity 35.2°.

SOUTH LOUISIANA WILDCAT FAILURE

Jefferson Davis Parish: Atlantic Refining Co. 1 W. E. Walker, 2-9s-6w, dry, TD 11,849 ft.

Texas Gulf Coast

Fayette County Prospect Tests Buda Lime Pay

HOUSTON.—Sohio Petroleum Co. 1 Brown estate, prospective discovery 5 miles northwest of Flatonia in Fayette County, is being plugged back to the Buda lime for additional tests. The well previously recovered oil on drill-stem test in that section. Operators drilled the well to 7,862 ft. in the Buda and set 7-in. casing on bottom. On drill-stem test at 7,826-62 ft., using ¼-in. chokes, recovery was 6,000 ft. of oil from open hole at the same interval, the well flowed 30 bbl. of 30.9°-gravity oil per hour under tubing pressure of 1,260 psi. The well died and was acidized with no results. It was then cored to total depth of 8,181 ft. in the Edwards lime where drill-stem test at 8,076-87 ft. recovered salt water and mud cut with gas. Location is in Jacob Stiffler League A-287.

A new gas pay has been established in Battle field, Victoria County, at Morris Cannan, Hawn Brothers, Liebman & Gibson 2 Pedro Pardo. Approximately 100 ft. below the regular field pay, operators perforated at 4,879-85 ft. and then gaged a flow of 19,000,000 cu. ft. of gas daily. The regular field pay was perforated at 4,764-67 ft., and the well flowed 115 bbl. of oil through 9/64-in. choke. Hole is bottomed at 5,256 ft. and pipe is set to 4,953 ft. Location is on a 40-acre lease in P. Callarde Survey, A-32.

Production has been extended on the northeast flank of Helen Gohlke field, DeWitt County, at Henshaw Brothers 1 J. B. Wells. The well flowed 167 bbl. of 34°-gravity oil daily through ¼-in. choke. Perforations were effected at 8,150-57 ft. Total depth is 8,195 ft. This extension is located in Robert Burns Survey, A-130, ½ mile east-northeast of Humble's 1 Rosenfelder well.

Free gas on a drill-stem test indicates a possible new discovery in Bee County at Newman Brothers and Alaska Steamship Co. et al 2 Charles Mengers, G. Garcia Survey, A-167. The show was at 4,800 ft., and further details of the test were not available. Operators are reported coring ahead toward 4,860 ft., where casing will be run for further testing. Nearest production is 2 miles north of Tynan field.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Bee County: Houston Oil Co. of Texas-George H. Coates 1 I. H. McCracken et ux, Patrick O'Boyle Sur., A-46, dry, TD 4,627 ft.

New Bros. Drilling Co. et al 1 Frank J. Sugarek, BS&F Sur., A-119, dry, TD 4,500 ft.

Calhoun County: Humble Oil & Refining Co. 1 San Antonio Bay, State Tract 50, San Antonio Bay Sur., dry, TD 7,000 ft.

Chambers County: The Texas Co. 1 Elmer R. Kilgore, John Steel Sur., A-227, dry, TD 8,110 ft.

DeWitt County: T. F. Murchison 1 Mrs. J. R. Benbow, J. G. Swisher Sur., A-421, dry, TD 8,016 ft.

Karnes County: Forest Oil Corp. and Kirkwood & Co. 1 H. A. Discher, Carlos Martinez grant, A-6, dry, TD 6,710 ft.

Live Oak County: Forney & Winn 1 Alma M. Bell, A. Parks Sur., A-322, dry, TD 5,295 ft.

C. G. Glasscock 1 Terrell Ranch, M. Killely Sur., A-20, dry, TD 7,720 ft.

V. G. Schimmel 1 C. W. B. Christensen,

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Antonio Fernandez Sur. 18, A-179, dry, TD 3,719 ft.

Montgomery County: Moran Oil Co. 1 R. G. O'Banion et al, Neil Martin Sur., 6 mi. W of Willis, dry, TD 5,255 ft.

Victoria County: H. L. Hunt 1 J. W. Ragsdale, Fernando de Leon Sur., A-67, dry, TD 6,999 ft.

Southwest Texas

Sunray Exploration Shows for Discovery

CORPUS CHRISTI.—A new oil discovery for Starr County is indicated at Sunray Oil Corp. 1 G. G. Zamora, Section 883, Flores Grant, which had shows of oil in sidewall cores at 6,184-95 ft. Gas shows were encountered at 6,220-25 ft. Operator is now running casing prior to testing the shows. Former plans were to plug back for completion attempts in the Sullivan gas sand around 4,350 ft. The prospective discovery is 12 miles northeast of Sullivan City and 500 ft. northwest of the Starr-Hidalgo County line.

Atlantic Refining Co. has set pipe to commence testing a new deep pay in London field, Nueces County. Hole is bottomed at 8,999 ft., and operator set 7-in. pipe at 8,994 ft. The venture, 1 C. J. Horne, cored shaly sand with good oil odor at 8,548 ft. Location is in Section 24, R. de Ynojosa Survey, A-4111, ¾ miles west of London field.

Potential test has been run at a new pay discovery for Taft field, San Patricia County. Atlantic Refining Co. 1 W. L. Roots, Lot 2, Section 24, fourth addition to Taft Farm Lands, blew 97 bbl. of oil daily through perforations at 6,397-6,402 ft. Gravity of the oil is 39.3°. Total depth is 7,008 ft., and oil string is cemented at 6,476 ft. Regular production in the field is from the 4,500-ft. level.

Dual gas production from two zones in the Pfluger sand, one a possible new pay, seems in the offing for West Bishop field, Nueces County. Eastern States Petroleum Co., Inc., 1 H. A. Pearson, was completed in the middle Pfluger sand at 7,211-14 ft. for 2,200,000 cu. ft. of gas daily. The lower Pfluger was perforated at 7,231-46 ft. and the well made an initial gage of 11,500,000 cu. ft. of gas daily through the casing. There was some condensate with the gas.

F. William Carr et al have run potential test on a new Duval County strike, 1 A. G. Black. Through perforations in the lower Pettus, the well flowed 88 bbl. of 44°-gravity oil daily through ⅛-in. choke. The well developed 490 psi. tubing pressure and 925 psi. casing pressure. There is a possibility the well will be considered an extension to North Fitzsimmons field.

The new Los Torritos field, Hidalgo County, has two new completions in a third pay for the field. Taylor Refining Co. and Mayfair Minerals, Inc., 1 William Brewster recovered 75 ft. of distillate on 6-hour drill-stem test at 6,746-51 ft. Meanwhile, L. M. Lockhart has completed 3 First National Bank of Chicago in the 6,700-ft. sand after drilling to 6,763 ft. and setting pipe on bottom.

A flow oil well is being completed in Branyon field, Caldwell County, which is largely a pumping field. V & M Oil Co. and Z. V. Morgan, Trustee 1 Abe Luce, John A. Neill Survey, flowed 60 bbl. of oil from the Austin chalk at 2,046-2,139 ft. The well was treated with 3,000 gal. of acid at that depth for completion attempt.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

San Patricio County: New pay at Taft—Atlantic Refining Co. 1 W. L. Roots, Sec. 24, fourth add. to Taft Farm Lands, TD 7,008 ft., perf. 6,397-6,402 ft., 97 bbl. oil, 8/64-in. choke, gravity 39.3°.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bell County: J. P. Bristow & Co. 1 Hugo

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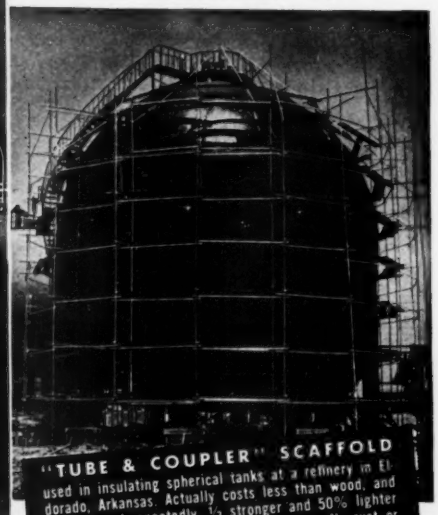

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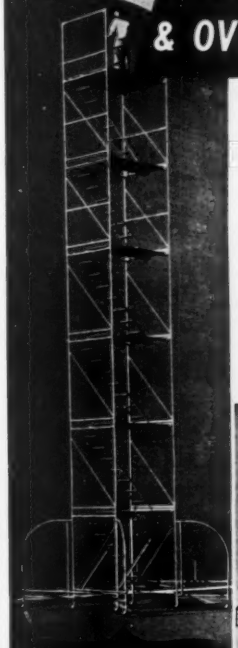

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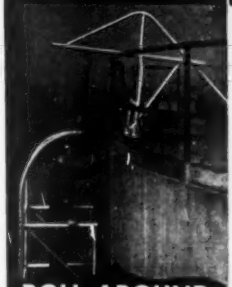

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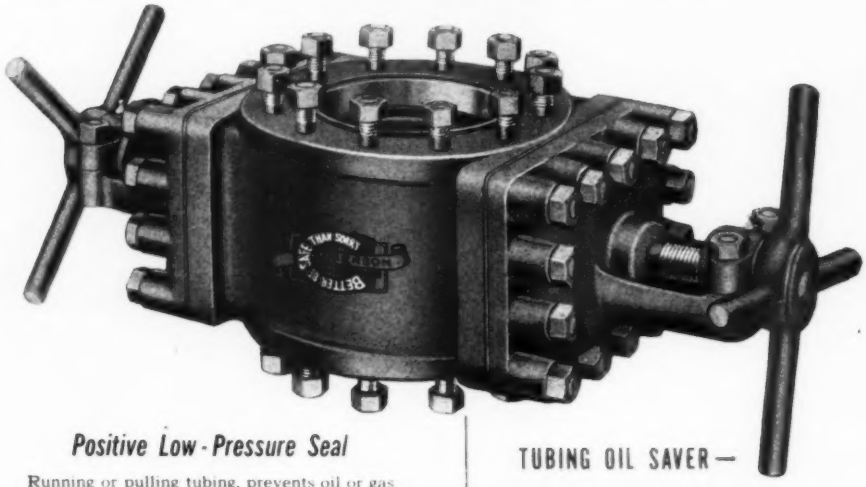

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Milam Drilling Co. 1 W. J. A. Cronin, Thomas Leckie Sur. A-817, dry, TD 6,003 ft.

Guadalupe County: Pat Baker et al 1 Isaac Allen Est., J. M. Bell Sur., A-75, dry, TD 2,184 ft.

Jim Wells County: C. A. Daubert and Walter J. Achning 1 C. Schuenemann et al, Block 13, San Antonio de Agua Dulce Gr., dry, TD 5,012 ft.

La Salle County: Henderson Coquat and O. R. Mitchell 1 Carlos Pena, I&GN Sur. 19, Blk. 2, A-897, dry, TD 5,757 ft.

Nueces County: A. W. Gregg 1 W. E. Pope Est., Brooklyn Peninsula, near Nueces Bay, dry, TD 7,500 ft.

Southern Minerals Corp. 1 L. A. Wolter, Sec. 145, F. Z. Bishop Subdiv., dry, TD 7,665 ft.

Starr County: Watson & Precision 1 Valley Brick & Tile Co., Porcion 86, 5 mi. SE Rio Grande City, dry, TD 1,710 ft.

Michigan

New Traverse Area Being Developed

MOUNT PLEASANT.—A new localized Traverse high was being developed and confirmed in the shallow Geneva field area, Van Buren County, this week. Norman L. Stevens was testing at the 1 Lafler, NW SW SE 27-1s-16w, Geneva Township, at 1,049 ft., and reported that the well flowed 280 bbl. of net oil during the first 24 hours after acid treatment with 1,000 gal.

Top of the objective lime was logged at 1,046 ft., and pay sand was drilled from the contact to the total depth. The hole carried 400 ft. of free oil, natural, in 1 hour after drill in.

The 1 Lafler is the direct south offset to Hoyt & Palmer 1 Cummings which tapped Traverse lime about 2 weeks ago and is being pump-tested, natural, with a reported 5-9 bbl. of oil showing daily. The 1 Cummings is the discovery of this local extension of the general Geneva field feature.

On preliminary evaluation after the completion of the 1 Lafler producer, it appeared that an active development program would begin in the area. Stevens, major acreage holder in the new play, estimated that drilling should find from 18-25 producers, providing current control information proved what it now seems to be.

Hoyt & Palmer were drilling at the 2 Cummings, SE NW SE 27-1s-16w, an offset to the 1 Cummings, and Stevens indicated that if this development proved to be commercial his next move in the pool would be a south offset to the 2 Cummings, which would also be the direct east 10-acre offset to his 1 Lafler.

MICHIGAN WILDCAT FAILURES

Allegan County, Fillmore Township: Swanson Consolidated Oil Co. 1 Schrotenboer, NW NW NE 32-4n-15w, Traverse 1,489 ft., dry, TD 1,494 ft.

Mason County, Riverton Township: Superior Oil Co. 1 Morton, SW SW SW 16-17n-17w, Monroe 2,350 ft., dry, TD 2,416 ft.

Mecosta County, Fork Township: Chartiers Oil Co. 1 Olmstead & Olmstead, NW NW NW 30-16n-7w, Dundee 3,872 ft., dry, TD 3,879 ft.

Green Township: McClure Oil Co. 1 Carr-Hamilton, NE SE SE 15-16n-10w, Stray 1,231 ft., dry, TD 1,276 ft.

Muskegon County, Montague Township: Turner Petroleum Corp. 1 Butzer, SE NW NW 8-12n-17w, Dundee 2,176 ft., dry, TD 2,195 ft.

Osceola County, Richmond Township: Miller Industries, Inc. 1 Fee, SE NE NE 9-17n-10w, Stray 1,243 ft., dry, TD 1,271 ft.

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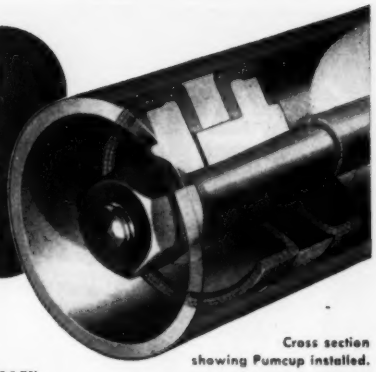

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Roscommon County, Roscommon Township: Taggart Bros. Gas Co. 3 Hilliard-Bowman, SE 28-22n-4w, dry in Stray sand, TD 1,194 ft.

Mississippi

Tinsley Test Sets Casing At 13,877 Ft., Will Core

JACKSON.—On the west side of Tinsley field, Yazoo County, Union Producing Co. and Jones-O'Brien 1 Logan, has run drill-stem test to test casing after setting 7-in. at 14,059 ft. in sidetracked hole. Packer was set in the casing at 13,877 ft., and on 20-minute test, recovery was 150 ft. of rat-hole mud. Bottom-hole flowing pressure was 75 psi. Weight of the mud at the time of test was approximately 10 lb. per gallon. Operators are now building up mud weight to 16 lb. per gallon and expect to start coring within a few days. Hole is bottomed at 14,074 ft.

Mechanical difficulties have delayed taking potential test at the Glazier field discovery in Perry County. Union Producing Co. A-1 B. M. Stevens, 19-4n-9w, increased from 14 bbl. to 80 bbl. of oil daily when operator increased the speed and stroke of the pump. This is not a true indication of the producing capacity of the well, however, because no test has been made for a period of over 10 hours. Also, because of the low gravity (11.1°) and high viscosity of the oil, operator has been experimenting with injecting diesel fuel to dilute the oil. It is reported that this operation has been unsuccessful.

Roeser & Pendleton-Pan-Am Production Co. have potentialed the best well to date in West Lincoln field, Lincoln County. Operators' 1 Barney Grice, 22-6n-6e, flowed 306 bbl. of oil daily through 12/64-in. choke under tubing pressure of 1,130 psi. It is reported that the same operators are currently making preparations to drill three additional wells in the field, two being direct offsets to the 1 Grice and one a northwest offset.

MISSISSIPPI WILDCAT FAILURES

Adams County: Plains Production Co. 1 A. H. Sojourner estate, 12-5n-2w, dry, TD 6,817 ft.

Franklin County: G. A. Clements-O. G. Stanford 1 Lizzie Jackson et al., 25-6n-1e, dry, TD 6,760 ft.

Lauderdale County: R. G. Houser 1 J. B. Gunn, 18-7n-17e, dry, TD 3,492 ft.

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Canadian Fields

Third Success for Barons Indicated

CALGARY.—Oil success has been indicated at a third well in the Barons area, ¼ mile east offset to the discovery. Hole is now standing cemented with production string of casing set. The well, located on farmout lands from Barons Oil, Ltd., was drilled by the team of Central Leduc Oils, Ltd., and Del Rio Oil Producers, Ltd., who have staked site for the next venture on that farmout, ¼ mile west of the discovery.

The new indicated producer, Barons-Central-Del Rio 2, in LSD 9 15-12-23w4, completed drilling and set string of 5½-in. casing at 4,099 ft.

Since the Barons discovery well was drilled, six other wells have been completed (one oil success and five dry holes). The first follow-up to the success was drilled by Monarch Oils, Ltd., on farmout lands from Barons Oil about ½ mile east of the discovery.

Selburn Oil Co. group has an indicated D2 oil success at its initial venture on a quarter section of Crown Reserve lease in the northern sector of Stettler-Devonian oil field.

The well, Selburn-Deep Valley-Stettler 1, in LSD 8 28-38-20w4, is located ¼ mile west of Trans Empire-Stettler 2 D2 oil well. First D2 drill-stem test, from 5,212-23 ft., gave a maximum gas flow rate of 75,000 cu. ft. daily, with recovery being 260 ft. of oil and 20 ft. of oil and gas-cut mud. Latest test, from 5,207-25 ft., gave estimated gas flow rate of 100,000 cu. ft. daily and 1-hour pipe recovery consisting of 1,380 ft. of oil and 60 ft. of salt water. Crew is now planning to run string of production casing for completion.

Another Crown Reserve quarter-section parcel has proven to be productive of oil. Superior-General-Altex team has found oil at its drilling venture on the central east side of Redwater oil field. The well, Superior-Redwater 1, in LSD 4 7-57-20w4, is situated on a 160-acre tract purchased for cash bonus $65,111.

Superior 1 topped D3 zone of Devonian at 3,241 ft., or 1,166 ft. subsea, indicating approximately 72 ft. of D3 zone above water. Cores showed good porosity. Drill-stem test at 3,239-84 ft. gave a slight gas blow plus a recovery of 1,620 ft. of gassy oil. String of production casing has been set at 3,315 ft.

Canadian Delhi Oil, Ltd., carrying out a multimillion-dollar gas exploration and development program in Alberta, released details of drill-stem tests at its Cessford 7 well which indicate that it is the largest gasser so far drilled in that area.

In the Cessford area of southern Alberta, about 100 miles east of Calgary, Delhi has struck large natural gas flows in the top of the Blairmore and in the basal sand horizons at its Cessford 7 well. Classed as Delhi's largest gas well in that area, Cessford 7 is located in LSD 3 5-25-12w4, 5½

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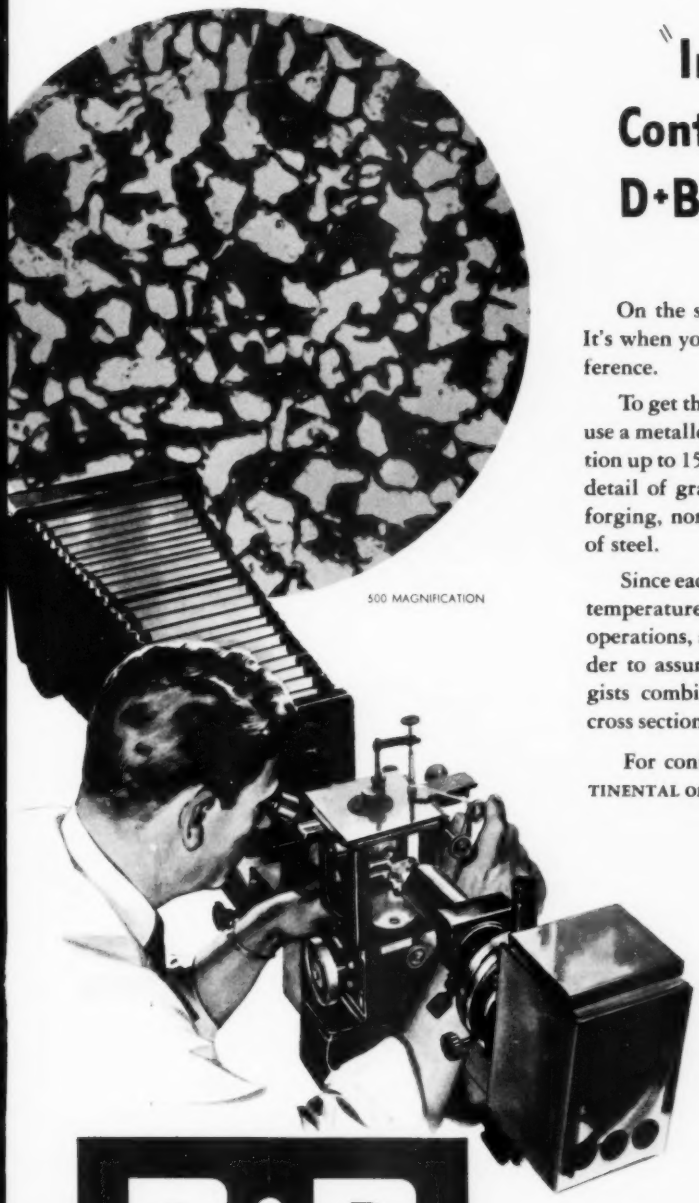

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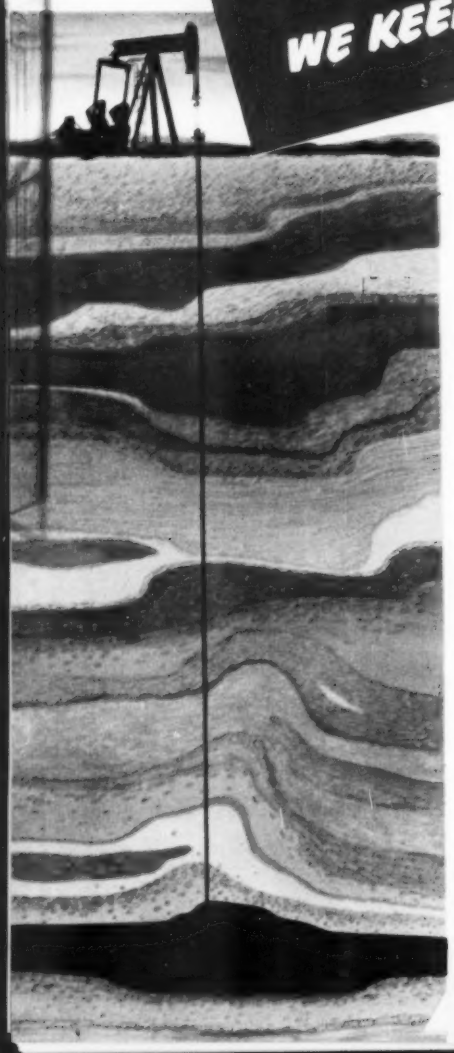

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miles due east of Cessford 5, Cretaceous oil discovery well, and 6 miles northeast of Cessford 2 gas well.

Results of two drill-stem tests run in top of the Blairmore are as follows: 2,995-3,005 ft., valve open 65 minutes, natural gas to surface in 1 minute at maximum rate of 5,253,000 cu. ft. daily; 3,005-15 ft., 67-minute test, gas in 15 minutes, with rate of 5,283,000 cu ft daily at end of 55 minutes.

Tests in the basal section were: 3,315-23 ft., 1 hour in duration, gas flow immediately, at rate of 2,621,000 cu. ft. daily, recovered 5 ft. gas-cut mud; 3,323-33 ft., 1 hour, gas in 10 minutes, at rate of 2,504,000 cu. ft. daily. Crew is now drilling ahead below 3,333 ft.

CANADIAN SUCCESSFUL WILDCATS

American Leduc-Bashaw 1, in LSD 16 31-41-22w4, TD 5,819 ft.; IP 960 bbl. oil daily.

Tor American-Bonnyville 1, in LSD 11 29-60-5w4, TD 1,117 ft.; on pump production.

CANADIAN WILDCAT FAILURES

Brown-Beaverhill Lake 1, in LSD 11 1-58-18w4, TD 3,900 ft.

P.C.L.T.-Camrose 1, in LSD 15 8-45-21w4, TD 5,002 ft.

Oil Crest-Monogram-Delia 1, in LSD 14 29-39-17w4, TD 4,403 ft.

Pacific-Seaboard-Eureka 1, in LSD 4 23-86-4w6, TD 4,002 ft.

Anchor-Scurry-Explorers-Jupiter 1, in LSD 8 28-77-19w5, TD 6,990 ft.

Socony-Central-Del Rio-Rumsey 1, in LSD 16 27-33-20w4, TD 5,975 ft.

Shell-B.A.-Whitelaw 4, in LSD 12 34-81-1w6, TD 4,437 ft.

Canadian Delhi-Winnifred 1, in LSD 16 3-10-10w4, TD 3,232 ft.

Louisiana-Arkansas

Dormant Beekman Pool May Be Reactivated

SHREVEPORT.—Activity may be revived in the old one-well Beekman field in Morehouse Parish. Justiss-Mears Oil Co. et al. 1 Crossett Lumber & Development Co., SW NE 6-22n-6e, tested oil from perforations in the Cotton Valley at 3,649-56 ft. The well was drilled to 3,953 ft. Storage tanks are being built for state potential.

The wildcat is located in the same section as the pool opener, Union Producing Co. A-1 Crossett Lumber & Development Co., the only producer in the field. The A-1 Crossett has been shut in for some time.

In Catahoula Parish, Saline Lake field has a prospective southeastern extension at Hunt Oil Co. 33 Louisiana Delta Hardwood Co. et al., Section 7-4n-5e. Sidewall cores at 5,765-5,943 ft. had oil shows. Total depth is 6,050 ft. with 7-in. pipe set to 6,012 ft.

Two miles northwest of Homer field, Claiborne Parish, Continental Oil Co. plans to deepen a wildcat plugged in 1945. Old total depth at the 1 E. K. Gladney, 10-21n-8w, was 7,516 ft. in the Travis Peak. Continental will drill to 11,000 ft. to test the Smackover.

Southwest Gas Producing Co. and Feazel 2-A Peterson, offset to the oil discovery in Hico-Knowles field, and the second well for the area, gaged 102 bbl. of oil per day on pump. It is located in Section 25-20n-4w. Production is from the new horizon, Woodruff sand, at 4,924-58 ft.

Arkansas.—Stanolind Oil & Gas Co. is preparing to test the upper Pettit at its 2 Pine Woods Lumber Co., confirmation attempt in the North Shongaloo area of Columbia County. The well found only salt water in the lower Pettit.

The same operator will drill a confirmation try to Ft. Lynn pool in Miller County. The well is B-1 Miller Land & Lumber Co., C SW SE 17-18s-27w. The pool was opened by Stanolind 1 Miller, 20-18s-27w, last year. Production was from the Rodessa at 6,303-12 ft.

Northwestern Arkansas.—Pure Oil Co. brought in a small gas discovery in NE NE NW 33-12n-24w, Johnson County. The test, 2 Low Gap unit, made 430,000 cu. ft. of gas from the Atoka at 1,273-87 ft. The following tops were picked: Kessler lime 1,346 ft., Brentwood lime 1,555 ft., Cromwell sand 1,561 ft., Pitkin 1,900 ft. (See The Oil and Gas Journal, December 28, 1950, page 105).

Some 3 miles northeast of the new well, the same operator completed its 1 Low Gap unit as dry at 3,520 ft. This failure was spotted in C NW NW 17-11n-24w. The following tops were reported: Kessler 1,810 ft., Brentwood lime 1,990 ft., Hale sand 2,025 ft., Pitkin lime 2,371 ft., Fayetteville 2,558 ft., Boone 2,790 ft., Sycamore 3,070 ft., Penter 3,085 ft., Lafferty 3,235 ft., Casen shale (Sylvan?) 3,414 ft., Fernvale 3,424 ft., St. Peter 3,465 ft.

NORTH LOUISIANA WILDCAT FAILURES

Caddo Parish: McAlester Fuel 1 Magourik "A," 1,249 ft. north and 1,391 ft. east SWc 34-22n-15w, dry, TD 9,460 ft.

DeSoto Parish: Lacy 1 Baxter, C SW SW 33-13n-16w, dry, TD 6,462 ft.

Grant Parish: Crow Drilling 2 Colfax, C SE SE 26-8n-5w, dry, TD 4,008 ft.

Richland Parish: Caddo Oil 1 Barham, C NW 28-17n-7e, dry, TD 4,505 ft.

Webster Parish: Duerr et al 1 Pine Woods Lumber, irregular Section 37-23n-11w, dry, TD 6,117 ft.

Winn Parish: Natural Gas & Oil 1 Urania Lumber Co., 1,380 ft. north and 1,260 ft. east SWc 12-11n-1e, dry, TD 3,486 ft.

Natural Gas & Oil 2 Urania Lumber Co., 12-11n-1e, dry, TD 3,494 ft.

ARKANSAS SUCCESSFUL WILDCATS

Johnson County: Pure Oil 2 Low Gap unit, NE NE NW 33-12n-24w, 450,000 cu. ft. gas, TD 2,015 ft.

Union County: Saulsbury & Sons 1 Allen, NW SE SE 18-17s-14w, 320 bbl. oil from

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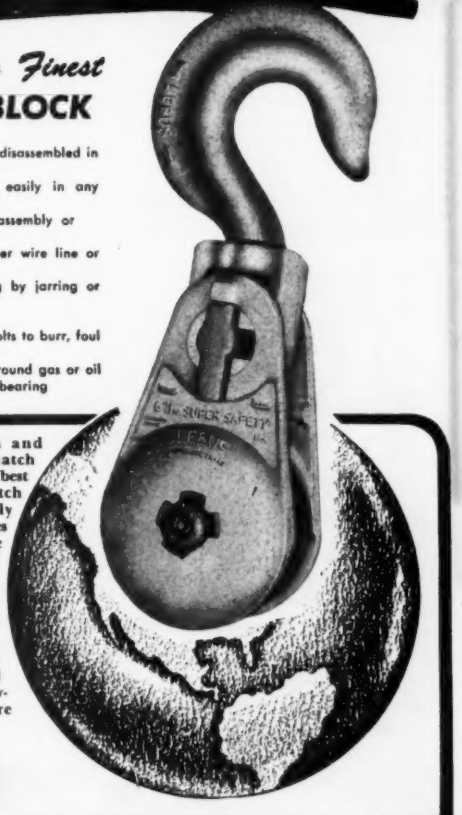

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ARKANSAS WILDCAT FAILURES

Calhoun County: Garland Anthony Oil 1 Hornaday, NE NE NE 3-11s-13w, dry, TD 3,920 ft.

Columbia County: Carter Oil Co. 1 McMertise School, 652 ft. south and 648 ft. west of NE corner 29-19s-20w, dry, TD 11,001 ft.

Johnson County: Pure Oil et al 1 Low Gap unit, C NW NW 17-11n-24w, dry, TD 3,520 ft.

Nevada County: Lion Oil 1 Cleary, SW NE NE 14-14s-22w, dry, TD 3,508 ft.

Ouachita County: Wadley 1 Cole, W/2 NE SW 13-15s-18w, dry, TD 5,491 ft.

Union County: Murphy Petroleum 1 Robertson, SW SE NE 33-18s-14w, dry, TD 2,095 ft.

White County: Irene Oil & Gas 1 Nevils, SW NW NE 14-6n-6w, dry, TD 1,323 ft., Midway 150 ft., Arkadelphia 445 ft., Nacatoch 490 ft., Paleozoic 660 ft.

Permian Basin

Martin County Wildcat Finds Ellenburger Oil

MIDLAND.—Tide Water Associated Oil Co. 1 Dickenson, Martin County Ellenburger discovery, made a good flow of oil on drill-stem test, estimated around 28 bbl. hourly, but had the test terminated by mechanical difficulties.

The last reported test from perforations at 12,087-12,105 ft. had gas at the surface in 75 minutes and oil in 100 minutes. Oil in the pipe was reversed out, and according to reports, there was no formation water. A second test of the same section was under way.

Deep Rock Oil Corp. 1 McWhorter, Spraberry prospect north of Stanton, swabbed 28 bbl. of fluid in 24 hours, cutting 5-10 per cent sediment and the balance oil.

Sinclair Oil & Gas Co. 1 Tippett, north of Pegasus field, recovered 15 ft. of clean oil, plus 1,338 ft. of slightly gas-cut mud and some sulfur water from the Ellenburger, and was to plug back to test up the hole. A 4-hour test was made from 13,168-13,244 ft.

In Yoakum County, Continental Oil Co. 1 Pierson, failure in the Devonian at 12,325 ft., was testing perforations in the San Andres limestone. Jet shots around 5,129-80 ft. were treated with acid, then swabbed for 6 hours. Recovery was ½ bbl. of oil and the same amount of acid water an hour. Operators were moving in a lighter rig for further testing.

Chapman & McFarlin have made application to the Railroad Commission for permission to drill deeper at two sites in the extreme north edge of Cogdell field in Kent County. The wells are the 51 D. M. Cogdell in 46-97-H&TC and the 49 Cogdell in 33-97-H&GN. Proposed new depth of around 8,000 ft. was calculated to explore the Ellenburger.

In southeast Hale County, Standard Oil Co. of Texas 1 Joe E. Keliehor was scheduled to be deepened to 11,000 ft. to test the Ellenburger. The project in 3-97-Callihan CSL, was previously drilled to 8,010 ft., in the Pennsylvanian.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Andrews County: Cities Service Oil Co. 1-B Reed, 10-A36-PSL, TD 10,999 ft., elev. 3,116 ft., Pennsylvania 8,890 ft., pay 8,130 ft., flowed 487 bbl. 38°-gravity oil, ½-in. choke, GOR 982 cu. ft., TP 100 psi.

Borden County: Lario Oil & Gas Co. 1 T. L. Griffin, 46-25-H&TC, TD 7,110 ft., elev. 2,381 ft., reef 7,100 ft., pumped 310 bbl. 45°-gravity oil, 14/64-in. choke, GOR 1,163 cu. ft., TP 850 psi.

Martin County: Pan American Production Co. 1 F. D. Breedlove, League 258, Briscoe CSL, NW corner of county, TD 13,053 ft., elev. 2,895 ft., Devonian dolomite pay 12,078 ft., flowed 2,341 bbl. 41°-gravity oil, ¾-in. choke, TP 100 psi., GOR 20 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: Gulf Oil Corp. 1-G Higginbotham, 13-32-3N-T&P, dry, TD 9,674 ft., elev. 2,451 ft., Spraberry 5,680 ft., reef 7,997 ft., Mississippian 9,170 ft., Ellenburger 9,532 ft.

Concho County: S. D. Johnson 1 A. L. Lockett, W. Gotthardt Sur. 2,044, dry, TD 4,000 ft., Canyon lime 2,131 ft.

Rock Hill Oil Co. 1 S. L. Hartgrove, T. F. Benge Sur. 2, dry, TD 3,795 ft., elev. 1,650 ft., Caddo 3,042 ft.

Crockett County: Shell Oil Co. 1-5 University, 28-5-University Lands, dry, TD 11,446 ft., elev. 2,660 ft., Spraberry 6,026 ft., Pennsylvanian 8,960 ft., Ellenburger 11,222 ft.

Dawson County: James H. Snowden 1-10 Carrie S. Dean, 10-33-6N-T&P, dry, TD 8,460 ft., elev. 2,633 ft., Spraberry 6,302 ft., Canyon 8,360 ft.

Hockley County: Jake L. Hamon 1 Jim Horton, 9-716-CSL, dry, TD 10,014 ft., elev. 3,485 ft., Clear Fork 5,860 ft., Strawn 9,965 ft.

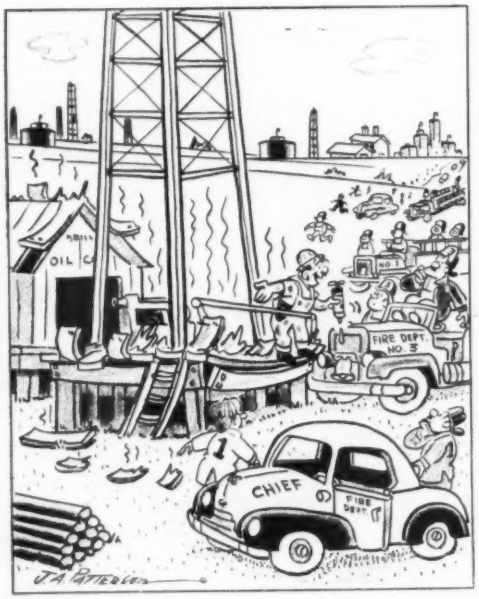
Howard County: Cosden Petroleum Corp. 1 L. S. McDowell, Jr., 3-34-T&P, dry, TD 3,500 ft.

Kent County: Gulf Oil Corp. 2 A. C. Cairns, 52-G-W&NW, dry, TD 7,537 ft., elev. 2,202 ft., Pennsylvanian 6,848 ft., Mississippian 7,286 ft., Ellenburger 7,510 ft.

Reeves County: Continental Oil Co. 1 Warren Wright, 5-70-PSL, dry, TD 13,007 ft., elev. 2,993 ft., Wolfcamp 8,850 ft., Devonian 12,720 ft.

Runnels County: Brooks & Turner 1 Frank Freitz, 89-1-J. P. Freitz Sur., dry, TD 3,830 ft., Canyon lime 2,291 ft.

W. H. Harvey Drilling Co. 1 Sealy &



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	Odessa, Texas....6-6774	Shreveport, La....3-5474
	Abilene, Texas...2-2790	Casper, Wyo.....3739
	Victoria, Texas....3264	Carmi, Ill.....7801
Distributors	Diamond Drilling Co., 2759 E. Willow St., Long Beach, Calif., Telephone: Long Beach 40-7949	
	Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861	
Foreign	D. T. O'Connor, 500 Fifth Avenue, New York, N. Y.	
	Petroleum Industry Consultants, C. A., Caracas, Venez.	
	Denton-Spencer Co., Ltd., Calgary, Alberta, Canada.	

Smith, Sec. 51, GH&H, dry, TD 3,755 ft., reef 2,408 ft.

J. W. King 1 A. R. Workman, Sec. 525, H. B. Bliss Sur., dry, TD 4,147 ft., elev. 1,762 ft., Serratt 2,485 ft., Gardner 3,860 ft.

Upton County: Gulf Oil Corp. 28-E J. H. Shirk, 1-3-MK&T, dry, TD 9,605 ft., elev. 3,066 ft., Ellenburger 9,450 ft.

Pearson & Sibert Oil Co. 1 King Ranch, 14-3-MK&T, dry, TD 3,586 ft.

Winkler County: Emperor Oil Co. 2 McCall-Cowden, 39-B5-PSL, dry, TD 5,015 ft.

Humble Oil & Refining Co. 1-B Evans, 45-73-PSL, dry, TD 11,745 ft., Pennsylvanian 8,480 ft., Devonian 9,530 ft., Simpson 10,850 ft.

Illinois-Ind.-Ky.

Another Pool Indicated In Monroe City District

DISCOVERY of another producing area for the Monroe City district of Knox County, Indiana, appears to have been made by Sam Jarvis and Lohmann & Johnson Drilling Co. at their 1 Helderman, in the S½ SW NE SE 21-2n-8w. The well, located 4 miles southeast of Monroe City and 2 miles from other production in the district, found good oil saturation in Aux Vases sand, logged at 1,314-23 ft., and with bottom still in the pay has casing run to 1,306 ft. for testing. A drill-stem test in this zone at 1,311-23 ft. filled 480 ft. of clean oil with bottom-hole pressure of 375 psi. There was no indication of water. Tester was open 2 hours. If a producer is completed, it will be the first from this pay zone in the general area.

Ashland Oil & Refining Co. and A. G. Becker are opening a new McClosky producing area 2 miles southwest of Clay City and 3½ miles east of Flora, in Clay County, Illinois. The indicated discovery well, 1 Oscar Lee, NE NW SW 26-3n-7e, now cleaning out and testing with casing perforated at 3,033-37 ft., filled 1,850 ft. of clean oil and 10 ft. of oil-cut mud in a previous drill-stem test of the zone at 3,021-38 ft. Total depth is 3,085 ft. with casing at 3,078 ft. The area is approximately 1 mile west of production in the Clay City-Noble Consolidated pool.

Carter Oil Co. 1 Van Winkle, NE NE SW 27-6s-7e, 4 miles west of Norris City and 2 miles southeast of production in the Dale-Hoodville Consolidated pool, in Hamilton County, Illinois, produced at the rate of 376 bbl. of oil and 342 bbl. of water per day in swabbing tests after acidizing. Prospective pay zone is McClosky lime, opposite which casing is perforated at 3,274-77 ft. Total depth is 3,330 ft.

A new pay zone is being opened in the area 4 miles northeast of Mt. Carmel, Ill., in the southwest corner of Knox County, Indiana, where George S. Engle 1 Steckler, SW NW SW 36-1n-12w, swabbed 10 bbl. of oil per hour from Benoist sand at 2,076-84 ft. Pay was shot with 60 qt. Bottom of the hole is still in saturation.

Winmar Oil Co. has a prospective Cypress sand well ½ mile east of production of the Owensville East pool in Gibson County, Indiana. Its 1 Douglas, NE SW SE 8-3s-11w, is testing saturation logged at 2,083-2,103 ft. A previous drill-stem test of that interval yielded 330 ft. of oil and 120 ft. of oil-cut mud. Total depth is 2,540 ft. Production tests are being made through a window opened in an alloy section in the casing string run through the pay zone to 2,193 ft.

New development on the southeast flank of the Birk City pool in Daviess County, western Kentucky, is proving successful in another well. G. L. Reasor 2 Wimsett, 19-P-27, is testing good saturation found in Renault lime at 1,858-1,919 ft. A drill-stem test of this zone had gas at the surface in 35 minutes and recovered 1,800 ft. of clean oil with tester open 2 hours. Total depth is 2,008 ft. Location is 2,000 ft. south of the same operator's 1 Thompson, another outpost well completed last week pumping 200 bbl. daily from O'Hara lime.

ILLINOIS WILDCAT FAILURES

Clay County: James McCollum 1 Frost, S½ SE SW 7-3n-6e, dry, TD 2,930 ft.

Perrine & Perrine 1 Stortzum, SW SW SW 12-5n-6e, dry, TD 2,867 ft.

Fayette County: The Texas Co. 1 Dwyer, NW NW NE 24-4n-1w, dry, TD 1,761 ft.

D. H. Bolin 1 Nobbe, SW SE SW 2-5n-4e, dry, TD 2,000 ft.

C. J. Simpson 1 Toberman, SW SW NE 27-8n-1w, dry, TD 1,629 ft.

Ben H. Nation 1 Wills et al, W½ NW SE NW 5-8n-3e, dry, TD 1,952 ft.

Franklin County: Walter Duncan-S. C. Yingling 1 Stalcup, NW NW NE 19-5s-3e, dry, TD 2,912 ft.

Gallatin County: Pure Oil Co. 1-A Atherton, SE SE NW 32-9s-8e, dry, TD 1,696 ft.

Hamilton County: Ben H. Nation 1 Clark, SW SW NE 19-4s-7e, dry, TD 3,545 ft.

Madison County: J. D. Crittenden 1 Hunecke, SE SW NW 17-6n-6w, dry, TD 602 ft.

Marion County: Atlas Drilling Co.-R. Halbert 1 Ray, NW SW NW 14-2n-3w, dry, TD 2,705 ft.

Richland County: Sanders & Fye 1 Kurtz, SW SW SW 4-2n-10e, dry, TD 3,224 ft.

Calvert Drilling, Inc., and Ashland Oil & Refining Co. 1 Berger, SW NE SE 34-4n-9e, dry, TD 2,997 ft.

Wayne County: Ryan Oil Co. 1 Lamb, NW NE SW 34-1n-9e, dry, TD 3,410 ft.

Pursuit Oil Co. 1 Knodell, SE NE SE 23-2s-8e, dry, TD 3,449 ft.

Tuley & Carter 1 Evans et al, SW NW SE 8-2s-9e, dry, TD 3,252 ft.

White County: Skiles Oil Corp. 1 Keck et al, NW NW SE 30-6s-11e, dry, TD 3,016 ft.

(Continued on page 203)

FOR PUMPING UNITS, ENGINES, MOTORS
TIME
CONTROL SWITCH
Operates on either battery ignition or magneto ignition engines. Controls engines direct and electric motors through a relay. Up to 12 hour operation. Rugged construction. Easily installed.
WAIT MFG. CO.
P. O. BOX 1015
TULSA, OKLA.

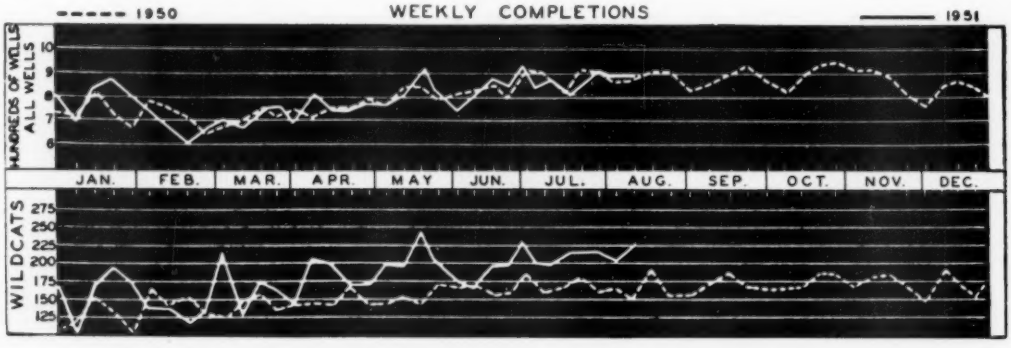
CURRENT STATISTICS

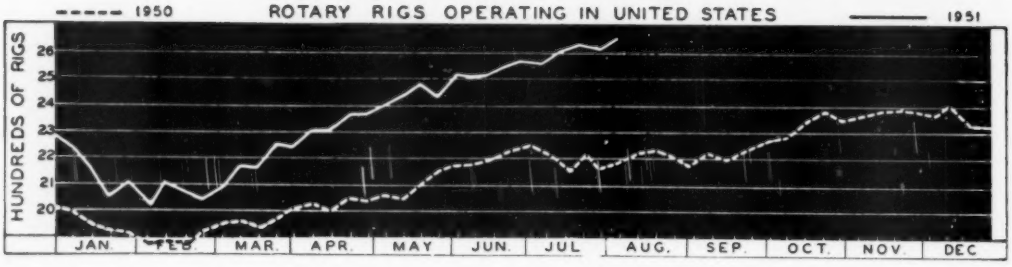
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . WEEK ENDED AUGUST 11, 1951

	Total of all wells					Aug. 11		Wildcat completions and discoveries					Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	13	7	0	*6	18,967	301	307	0	0	0	0	0	0	0	0	0	0
Pennsylvania	15	8	1	†6	22,497	439	559	0	0	0	0	0	0	0	0	1	1
West Virginia	17	0	14	3	46,748	346	397	0	0	1	0	1	0	0	7	5	12
Ohio	28	6	4	‡18	71,097	560	593	0	0	1	1	2	1	0	5	16	22
Indiana	45	9	1	35	80,960	732	946	2	0	0	16	18	25	0	1	192	218
Kentucky	30	9	6	15	68,366	696	627	1	0	0	0	1	15	0	1	102	118
Illinois	44	12	0	32	115,428	1,303	1,649	0	0	0	17	17	38	0	0	310	348
Michigan	15	3	0	‡12	34,373	463	542	0	0	0	7	7	15	0	6	182	203
Kansas	97	50	12	35	313,057	2,600	2,224	7	0	0	21	28	134	0	11	525	670
Nebraska	0	0	0	0	0	144	68	0	0	0	0	0	4	0	1	66	71
Oklahoma	125	69	1	§55	404,101	3,372	3,294	3	0	0	18	21	116	2	15	432	565
Texas	329	186	12	131	1,511,742	10,124	9,890	14	0	0	81	95	443	36	75	2,046	2,600
North Central (Dist. 7-B & 9)	120	52	0	68	373,574	3,102	3,057	7	0	0	40	47	221	2	10	883	1,116
West (Dist. 7-C & 8)	93	71	0	22	539,327	3,049	2,924	6	0	0	16	22	101	9	5	389	504
Panhandle (Dist. 10)	9	2	5	2	29,847	419	565	0	0	0	0	0	2	0	0	14	16
Eastern (Dist. 5 & 6)	16	8	1	7	85,183	733	695	0	0	0	5	5	6	4	0	136	146
Gulf Coast (Dist. 2 & 3)	51	27	4	20	313,312	1,422	1,373	0	0	0	11	11	57	14	39	292	402
Southwest (Dist. 1 & 4)	40	26	2	12	170,499	1,399	1,276	1	0	0	9	10	56	7	21	332	416
Louisiana	49	28	0	21	296,306	1,250	1,509	2	1	0	8	11	28	5	5	161	199
Northern	37	19	0	18	171,534	660	795	0	0	0	7	7	7	0	3	93	103
Southern	12	9	0	3	125,062	590	714	2	1	0	1	4	21	5	2	68	96
Arkansas	18	7	1	10	49,624	245	251	1	0	1	7	9	10	0	3	52	65
Mississippi	6	2	0	4	38,052	203	193	0	0	0	3	3	10	3	0	71	84
Southeastern States	0	0	0	0	0	38	39	0	0	0	0	0	0	0	0	14	14
Montana	0	0	0	0	0	126	115	0	0	0	0	0	0	0	0	28	28
Wyoming	13	8	1	4	67,213	438	350	0	0	1	0	1	7	0	1	56	64
Colorado-Utah	6	3	0	3	38,041	160	54	1	0	0	3	4	6	0	4	80	90
New Mexico	1	0	0	1	1,490	404	389	0	0	0	0	0	10	0	7	47	64
California	45	35	0	10	176,083	1,350	1,084	0	0	0	8	8	31	0	1	264	296
Miscellaneous	0	0	0	0	0	33	9	0	0	0	0	0	0	0	19	13	32
Total United States	896	442	53	401	3,354,435	25,327	25,105	31	1	4	190	226	893	46	162	4,663	5,764
Total previous week	896	472	65	359	3,459,536			36	0	5	161	202	862	45	158	4,473	5,538
Total August 11, 1950	877	500	70	307	3,170,821			25	0	3	122	150	657	47	117	3,772	4,593

Service wells included: *6, †5, ‡2, §7





DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 11 crude oil	B. of M. Aug. demand	Aug. 4 crude oil
Alabama	3,100	2,400	3,050
Arkansas	77,100	85,000	76,750
California	978,100	980,000	979,200
Colorado	72,300	80,000	71,800
Eastern	61,750	64,000	58,500
Florida	1,825	1,600	1,825
Illinois	170,600	165,000	164,900
Indiana	32,700	29,000	32,500
Kansas	322,950	320,000	310,300
Kentucky	30,400	29,000	30,400
Louisiana	611,225	671,000	611,500
North Louisiana	115,000		114,700
South Louisiana	496,225		496,800
Michigan	38,700	42,000	39,500
Mississippi	100,800	104,000	100,250
Montana	24,200	24,000	23,400
Nebraska	6,300	10,000	6,400
New Mexico	147,300	154,000	147,200
Oklahoma	506,400	530,000	508,750
Texas	2,772,625	2,690,000	2,760,675
Dist. 1 (Southwest)	33,575		33,350
Dist. 4 (Southwest)	257,725		255,825
Dist. 2 (Gulf Coast)	161,175		160,950
Dist. 3 (Gulf Coast)	474,250		472,775
Dist. 5 (Eastern)	55,700		55,250
Dist. 6 (Eastern)	115,600		115,675
East Texas field	271,300		271,300
Dist. 7-C (West)	104,400		102,975
Dist. 8 (West)	971,050		965,025
Dist. 7-B (W. Central)	81,900		81,900
Dist. 9 (N. Central)	159,950		159,000
Dist. 10 (Panhandle)	86,000		86,650
Utah	4,200	5,000	4,100
Wyoming	196,100	178,000	195,200
Total United States	*6,158,675	6,164,000	6,126,200
Change from previous week, up	32,475		
Canada	150,820		145,110

Total U. S. production January 1-August 11 †1,328,746,295 bbl.
Same period last year (crude plus cond.) 1,150,069,905 bbl.

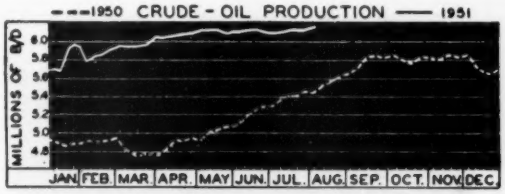
*Not including 100,415 bbl. condensate. †Including 23,547,090 bbl. condensate.

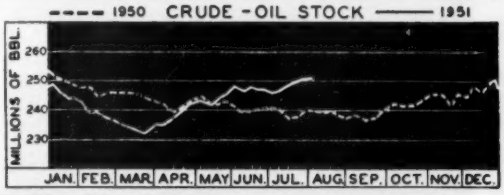
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

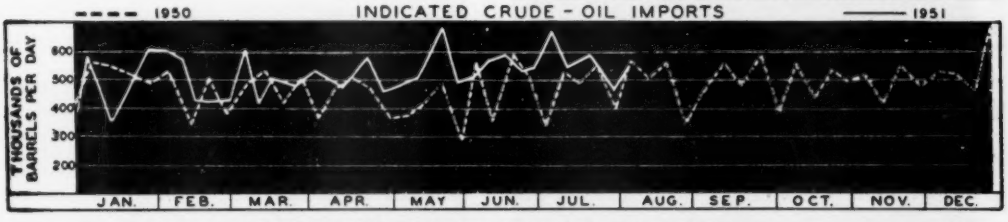
(Thousands of barrels)

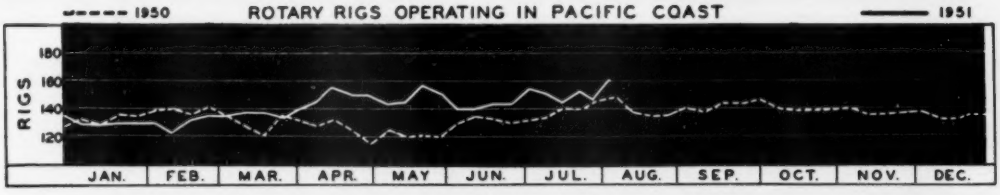
	Aug. 4, 1951	July 28, 1951	Aug. 5, 1950
Pennsylvania Grade	2,221	2,110	2,769
Other Appalachian	1,455	1,416	1,416
Illinois, Indiana, Michigan	11,084	10,793	9,232
Arkansas	2,777	2,928	2,805
Louisiana	14,657	14,287	14,522
North	2,754	2,762	3,230
Gulf	11,903	11,525	11,292
Mississippi	3,021	2,966	2,191
New Mexico	6,312	6,426	6,060
Oklahoma and Kansas	38,637	38,121	32,961
Texas	119,063	119,472	113,604
East Texas	14,662	14,362	15,498
West Texas	50,488	50,773	42,659
Texas Gulf	26,168	26,484	26,878
Other Texas	27,745	27,853	28,569
Rocky Mountain	13,711	13,896	12,094
California	30,599	30,594	34,277
Foreign	8,126	8,094	6,881
Total	251,663	251,103	233,812

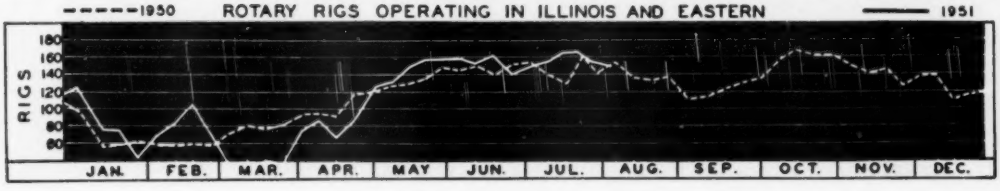
*Bureau of Mines.









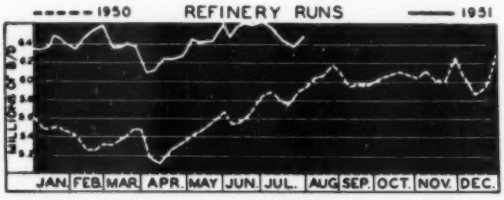


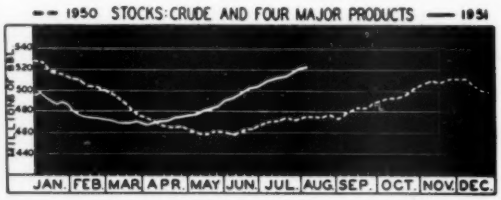
A.P.I. REFINERY REPORT, AUGUST 4

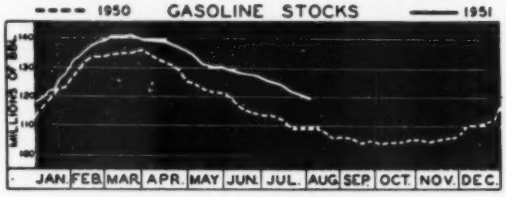
(Thousands of barrels)

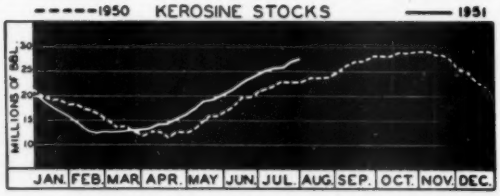
District	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, August 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production			
											Gasoline*	Kerosine	Distillate	Residual
East Coast	1,019	413.1	41.3	215.4	222.7	25,560	10,402	24,143	11,600	976	410.4	34.3	207.8	210.2
Appalachian:														
District 1	104	46.7	6.4	18.1	12.9	2,870	620	1,058	485	100	42.3	5.0	13.4	9.4
District 2	77	38.3	6.1	7.0	14.9	1,370	344	401	299	69	33.8	4.0	7.3	13.5
Ind., Ill., Ky.	1,215	625.8	81.7	215.1	163.4	26,292	6,132	17,162	5,186	1,070	583.3	64.0	166.9	137.0
Okla., Kans., Mo.	464	243.6	13.0	92.3	49.6	13,323	1,587	9,150	1,812	531	288.9	13.8	118.9	61.7
Inland Texas	261	173.8	15.0	46.9	45.1	3,668	503	1,484	1,035	225	140.3	10.5	32.0	46.0
Texas Gulf Coast	1,592	727.9	104.6	327.9	286.6	18,119	4,566	10,798	4,930	1,385	653.8	104.3	281.4	231.5
La. Gulf Coast	463	227.0	58.0	112.7	60.7	5,980	2,264	3,829	1,872	489	234.2	59.1	99.5	61.5
N. La. and Ark.	82	34.3	7.3	18.7	7.4	2,519	463	778	133	71	27.3	6.1	14.2	11.6
Rocky Mountain:														
New Mexico	15	8.6		2.9	4.0	126		66	33	15	8.1	.3	2.7	3.5
Other Rocky Mtn.	223	105.7	2.4	46.3	42.0	4,813	332	1,826	1,193	206	89.3	4.7	39.1	37.1
California	973	418.9	10.6	148.4	379.3	14,976	464	8,490	16,622	930	419.8	10.9	106.0	330.9
August 4, 1951	6,438	3,063.7	346.4	1,251.7	1,288.6	119,616	27,677	79,185	45,200	6,067	2,931.5	317.0	1,089.2	1,147.9
July 28, 1951	6,396	3,077.0	362.9	1,167.7	1,265.4	121,156	26,959	76,874	44,957					
August 5, 1950	5,944	2,826.1	293.6	1,059.9	1,154.1	108,895	23,560	62,235	41,791					

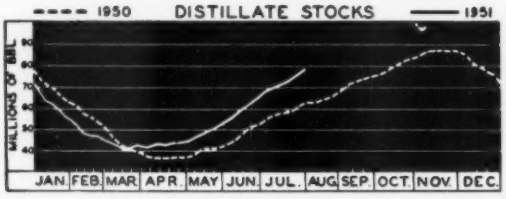
*At refineries including natural blended. †Finished and unfinished.

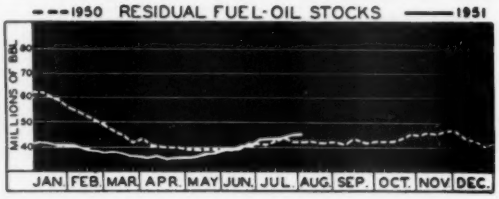


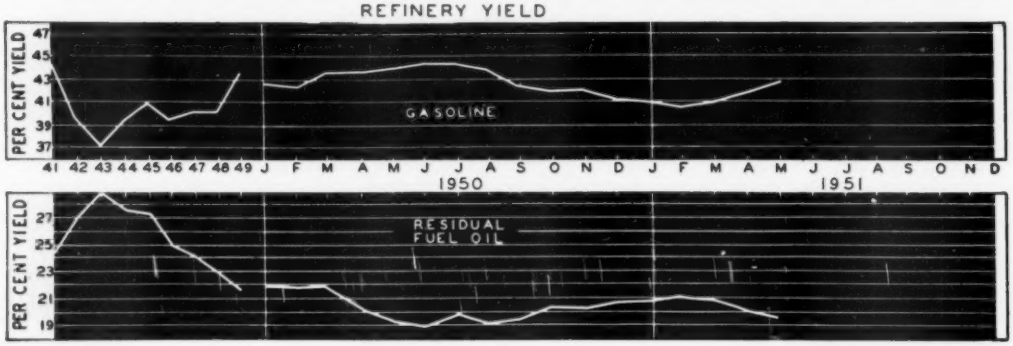











REFINERY YIELD
PER CENT YIELD
GASOLINE
41 42 43 44 45 46 47 48 49 J F M A M J J A S O N D J F M A M J J A S O N D
1950
1951
PER CENT YIELD
RESIDUAL FUEL OIL

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.30
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

HOME-HEATING fuels for the high-demand areas of the East Coast may be influenced by a price situation similar to the unbalanced residual market last winter. The low posting for No. 2 fuel on the Gulf Coast is 8 cents a gallon compared with a barge price of 9 cents in New York Harbor. In order to move distillate fuel from the Gulf Coast and sell on the barge market in New York Harbor, tanker rates would have to be less than the Maritime Commission base of $2.85 a long ton. Since 6-month tanker charters are now averaging about 50 per cent over the Maritime Commission base, a supplier cannot buy No. 2 on the Gulf Coast spot market, ship in currently chartered tankers, and sell on the New York Harbor market without taking a loss.

Despite this lack of balance between Gulf Coast and East Coast distillate prices, primary suppliers have moved most of the surplus distillate stocks to tanks on the East Coast. Primary stocks of kerosine and distillate fuel on the Gulf Coast are only 6 per cent greater than last year compared with an increase of 52 per cent for the East Coast.

Current reports indicate that East Coast distillate sales for domestic consumption are probably no larger than last year. Indicated refinery demand for distillate fuel in Districts 1 and 3 for the 4-week period ended August 4 was only about 3 per cent greater than for the same period last year. Since distillate exports have been higher than in 1950 because of the Iranian shutdown, sales for domestic use have been at about the 1950 rate for the period.

No general softening of the Group 3 market has been noted despite heavy inventory accumulations. Total clean product stocks (gasoline, kerosine, and distillate) in District 2 are 19,000,000 bbl. or 34 per cent greater than at the same time last year.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of August 13, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10	9
No. 2 straw fuel oil	8-8⅜	9	8
No. 6 residual	$1.75-1.80	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

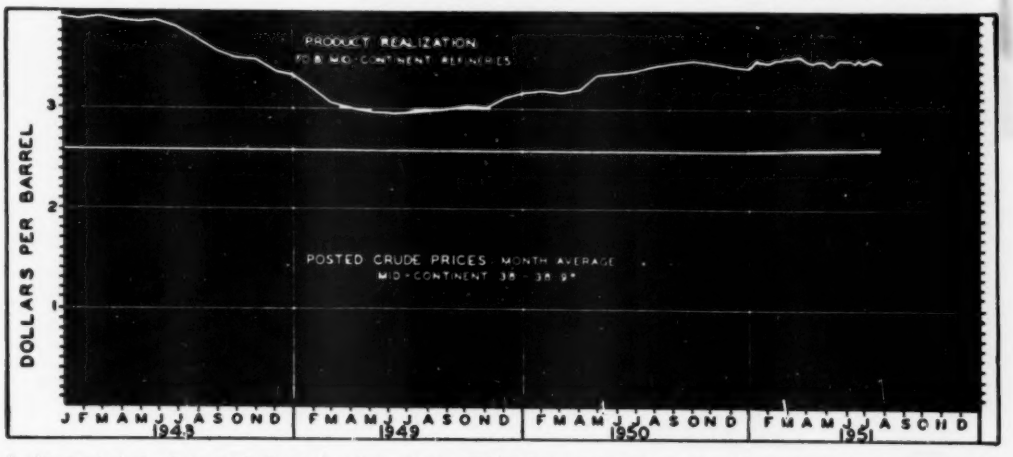
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.48 for week ended August 4, $3.51 for previous week, and $3.47 for August 1950.

Indiana Fields

(Continued from page 203)

INDIANA SUCCESSFUL WILDCATS

Gibson County: A. W. Cherry 1 Lutz, NW NW SW 13-4s-11w, IP 187 bbl., Aux Vases 2,287-94 ft., TD 2,297 ft. (extends St. James pool).

Posey County: Calvert Drilling, Inc.-S. Raitman 1 Spencer, SW SW NE 13-4s-13w, IP 28 bbl., Aux Vases 2,786-90 ft., TD 2,797 ft. (opens Stewartsville pool).

INDIANA WILDCAT FAILURES

Carroll County: Flora Oil & Gas Co. 1 Wagoner, NE SE SW 10-24n-1w, dry, TD 977 ft.

Daviess County: Don McCumber 1 Kane, SE SW SW 3-2n-5w, dry, TD 1,284 ft.

Dubois County: Claude B. Rose 1 Vanderbuilt, SE NE NW 7-2s-4w, dry, TD 721 ft.

Earl C. Ward 1 Gramelspacher, SE NE SW 13-2s-5w, dry, TD 824 ft.

Gibson County: Ashland Oil & Refining Co. 1 Hightower, SW SW SE 6-2s-8w, dry, TD 1,672 ft.

Harrison County: B. V. Stoll 1 Albert Hess, SE NW NE 6-4s-5e, dry, TD 2,290 ft.

Knox County: C. E. Skiles 1 Arterburn, Military Donation 16-2n-9w, dry, TD 1,677 ft.

H. Eiteljorg 1 Joseph, Military Donation 80-3n-8w, dry, TD 1,534 ft.

Olds Oil Co. 1 Judah, Military Donation 4-3n-9w, dry, TD 1,820 ft.

Owen County: Don Brummett 1 Miser, NE NW NE 31-9n-5w, dry, TD 1,520 ft.

Posey County: George & Wrather 1 Fuhrer, NW NE SW 12-6s-14w, dry, TD 3,008 ft.

Vanderburgh County: Crawford Production Co. 1 Lambert Community, E½ SE NW 25-4s-10w, dry, TD 2,222 ft.

Ralph Halbert 1 Stolz, NW SE SW 34-4s-11w, dry, TD 2,528 ft.

Vigo County: Great Lakes Carbon Co. 1 Robertson, SE SW NE 12-10n-11w, dry, TD 2,341 ft.

R. J. Lowery 1 Hochstetter, NE NE NW 2-11n-9w, dry, TD 910 ft.

Washington County: Albert Shackelette 1 Ponsford, NW NE NW 12-1n-3e, dry, TD 870 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Daviess County: G. L. Reasor 1 Thompson, S½ SW SW SE 19-P-27, IP 210 bbl., O'Hara 1,909-14 ft., TD 1,914 ft. (outpost Birk City pool).

EASTERN KENTUCKY

ASHLAND.—In Lee County on Big Sinking Creek Ashland Oil & Refining Co. is fishing for core barrel at 269 Eureka Coal & Mineral Co. Total depth is 1,175 ft. in the Corniferous lime section. Test is located in the Big Sinking Pool.

In Martin County and in Big Sandy gas field, United Fuel Gas Co. has completed 6671 Sallie Scalf as a two-pay gas well. Final open flow gaged 298,000 cu. ft. gas daily from Big lime at 1,640 to 1,679 ft., and in the Devonian black shale from 2,280 to 2,910 ft., total depth. Well was shot and acidized.

In northwestern Johnson County and in the Martha pool Ashland Oil & Refining Co. at 30 William Lester had first Weir sand at 740 ft. and second Weir at 801 ft. Total depth of hole is currently 846 ft. and operators are preparing to shoot both sands prior to completion.

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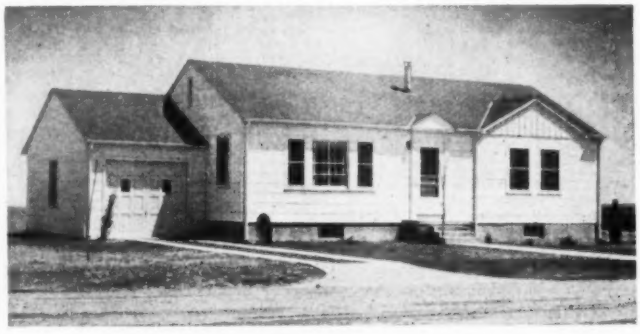

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STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. ● TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

Harrisburg Sales Opens New Branch Store

Announcement of the opening of a branch store at Odessa, Tex., for Harrisburg Sales & Service, Inc., was made recently from the Houston headquarters of the firm by Charles B. Caldwell, president. The building contains both office and warehouse space and is now open and in full operation. William D. Barnett is in charge of operations and Leroy Nix and Monte K. Roy are the storemen.

Known throughout the oil industry for sales and service on Harrisburg diamond hard pump liners, long-run pistons, piston rubbers and Moeco catheads, Harrisburg is adding three new products to its line. The new additions are the complete line of Fawick - Airflex clutches, Harrisburg low-pressure alarm and muderator.

Schulte New District Manager for Reilly Tar

The appointment of H. J. Schulte as district manager, operating from the new Cleveland sales office of Reilly Tar & Chemical Corp., has been announced by P. C. Reilly, Jr., vice president in charge of sales. The new office will handle sales in eastern Michigan, Ohio, western Pennsylvania, and the Buffalo area of New York.

Schulte started in the manufacture of coal-tar products in 1921 and during the past 30 years has built and operated coal-tar refineries in Chicago, Dover, Ohio; Newark, N. J.; Fairmont, W. Va.; and Cleveland.

EQUIPMENT MEN . . . in the News

Republic Names Johnson, Russell to New Posts

R. W. JOHNSON

W. D. RUSSELL

Roy W. Johnson, former general sales manager for Republic Supply Co. of California, has been advanced to executive vice president of that firm. His jurisdiction covers all departments of the organization throughout California.

W. Dale Russell, former senior vice president, succeeds Johnson as general sales manager. His responsibilities will include the development and coordination of an effective sales force. Russell joined Republic in 1917, the year in which it was founded.

Glitsch Divides Canadian Sales Territories

Fritz W. Glitsch & Sons, Dallas, announces the division of its Canadian sales efforts into two parts. The Province of Quebec will be handled by the New York office of Glitsch under the supervision of New York manager, G. W. Lindskog. Sales and service in the Province of Ontario will be directed by Glitsch's Cleveland office under the supervision of R. L. Allen, Cleveland manager.

The new plant is located at Uxbridge, Ont.

Tennessee Eastman to Market Own Additives

Tennessee Eastman Co. has announced that it will undertake the direct sale of its line of gasoline additives, which will be sold under the trade name of Tenamene. A pioneer in the field of antioxidants, Tennessee Eastman began the manufacture of gum inhibitors for gasoline over 15 years ago and has rapidly become a major producer of these products.

Tennessee Eastman's existing sales organization, with representatives in New York, Cleveland, Chicago, Los Angeles, San Francisco, Portland, and Seattle plus a new office in Houston, will handle the sale of Tenamene. On the West Coast the company is represented by Wilson Meyer Co. Stocks of Tenamene will be carried in Lodi, N. J., Houston, Los Angeles, San Francisco, and Kingsport, Tenn.

Technical service will be provided both at customers' refineries and at the company's development laboratories in Kingsport.

Lysaght Made Divisional Sales Manager of A. C. & C.

Vincent Lysaght has been appointed sales manager of the Helicoid gage division of American Chain & Cable Co., Inc. Lysaght has directed the sales of the Campbell machine division and Wilson mechanical-instrument division in the past.

John Morrison has been appointed product manager and will assist Lysaght in sales-development activities in the field.

Newman Is Sales Manager For Gulf Coast Machine

J. C. NEWMAN

J. C. Newman has been appointed sales manager for Gulf Coast Machine & Supply Co., with which company he has been affiliated since 1937. Newman came to work for Gulfco from Oil Well Supply Co.

The duties of sales manager were formerly handled by Clifford H. LeBlanc, who is executive vice president and general manager of the company.

Wilson New President of Alloy Casting Institute

Election of Warden F. Wilson, general sales manager, Lebanon Steel Foundry, Lebanon, Pa., as president of the Alloy Casting Institute, national technical organization of leading producers of stainless-steel castings, was announced recently by E. A. Schoefer, executive secretary of the institute.

Other officers elected at the institute's annual meeting at Hot Springs, Va., are: H. T. Harrison, vice president of Duraloy Co., Scottdale, Pa., vice president; and Schoefer, who was reelected as secretary and treasurer; G. A. Baker, vice president, Duriron Co., Inc., Dayton; and J. S. Wooters, of General Alloys Co., Boston, elected to 3-year terms as members of the board of directors.

Kellogg Names Wolf, Champlin Vice Presidents

Two new vice presidents have been named by M. W. Kellogg Co., Warren L. Smith, president, announced recently.

Russell J. Wolf, formerly assistant to the president, has been named vice president in charge of sales. He will also continue to supervise Canadian projects as a vice president of Canadian Kellogg Co., Ltd.

D. W. CHAMPLIN

RUSSELL J. WOLF

Formerly general manager of the equipment-manufacturing division of Continental Can Co., Donald W. Champlin is the new vice president in charge of Kellogg's manufacturing. His responsibilities include Kellogg's considerable annual volume in fabricated metal equipment for refinery, chemical, and electric-utility firms.

Du Pont Announces Changes In Its Sales Personnel

E. I. du Pont de Nemours & Co., Inc., has announced several appointments in its sales organization.

David H. Conklin was appointed assistant director of sales of the petroluem-chemicals division with direct responsibility for district sales offices. Conklin was sales-promotion manager for petroleum chemicals and, more recently, a member of the plants-development section of the organic-chemicals department. He joined Du Pont in 1947 and for some time was manager of the petroleum-chemicals division's West Coast district office in Los Angeles.

Joseph L. Stecher will continue as assistant director of sales of the division, in direct charge of products and services. Stecher started with Du Pont in 1915 as a laboratory assistant at the experimental station.

Charles Wirth, III, manager of the New York eastern district office of the division, has been made manager of wholesale sales in the Kinetic chemicals division of the company's organic-chemicals department. Wirth began with Du Pont in 1939 as a technical demonstrator, was made mana-

ger of the Mid-Continent district office for petroleum chemicals at Tulsa in 1947, and eastern manager in 1950.

Turco to Manufacture Dy-Chek Products

Dy-Chek Co., a subsidiary of Northrop Aircraft, Inc., and developers of the dye penetrant method of inspection, has decided to expand Dy-Chek activity through a licensing agreement with a major chemical producer.

Accordingly, Turco Products, Inc., Los Angeles, has been selected and its new Dy-Chek division will immediately assume both manufacturing and distribution functions. Turco's research laboratories will continue the Dy-Chek research program aimed at developing even more sensitive dye penetrant inspection materials.

Fraker Appointed Vice President of G.C.I.

C. L. Fraker has been appointed as vice president of Geophysical Consultants, Inc., Tulsa. Fraker has been engaged in seismograph exploration work for 20 years in the Mid-Continent, Gulf Coast, West Texas, Rocky Mountain, and Canadian areas. Before joining G.C.I. he was affiliated with Rogers-Ray, Inc., Houston, as a seismic supervisor. He has also been employed by Independent Exploration Co. and the geophysical department of Amerada Petroleum Corp.

Smith Joins Engineering Firm as Sales Engineer

E. C. SMITH

Earl C. Smith, active for the past 25 years in the fields of chemical-plant and oil-refinery design, construction, and operation, has joined Merritt-Chapman & Scott Corp. as a sales engineer, it has been announced by Ralph E. DeSimone, executive vice president and general manager. Smith will work under Myles C. McGough, vice president in charge of the company's industrial and building-construction division.

Smith was most recently associated with Brown & Root, Inc., Houston, as a sales engineer, and was formerly associated with Lummus Co. as a job and project engineer.

Hill Appointed Marketing Specialist for Motorola

Harry C. Hill, of Dallas, has been appointed by Motorola, Inc., to serve with Chester L. Pringle of Fort Worth as marketing specialist for Motorola

H. C. HILL

C. L. PRINGLE

Industrial Control Products, including microwave, carrier communications, supervisory control, and telemetering equipment.

Pringle, who has been serving as marketing specialist since January 1951, has been zone manager for Motorola's V. H. F. mobile communications operations in West Texas and New Mexico since 1946. Prior to joining Motorola, Pringle spent 5 years in field and design work on various specialized communications and instrumentation problems.

Hill has been associated with the communications and electronics industry since 1926, with such concerns as Southwestern Victor Co., Automatic Sales Corp., General Electric Co., General Electric Supply Corp., and Radio Corp. of America.

Dyk Is Manager for G.S.I. Rocky Mountain Division

Robert Dyk has been made manager of the Rocky Mountain division of Geophysical Service, Inc., with headquarters in Denver. He is a graduate of University of California and has been engaged in geophysical exploration for the past 15 years.

Prior to his new position Dyk was located in Bakersfield, Calif., where he was senior geophysicist for General Petroleum Corp.

Bethlehem Announces Opening of New Store

Bethlehem Supply Co. has announced the opening of a new store at Abilene, Tex., which will be combined with the Cisco, Tex., store to give improved service to the petroleum industry in the Abilene area.

Increased storage space has been made available for stocking an inventory of drilling, production, refining, and pipe-line equipment and supplies.

C. A. (Chuck) Pigg, who has been in charge of the Cisco store, will be store manager and field representative. He will be assisted by S. J. (Sid) Donalson, Jr., and J. S. (Jess) Weaver as field representatives.

Corbin Is New Sales Representative for BJ

B. F. CORBIN

Boyce F. (Bud) Corbin has been appointed sales and service representative for the oil-tool division of Byron Jackson Co., covering the Illinois, Indiana, and Michigan territory, according to Ben Hilliard, sales manager of the division. Corbin will make his headquarters in Olney, Ill.

For the past several years Corbin was associated with Loffland Brothers, Fred Manning, and Brinkerhoff drilling companies in the Rocky Mountain area.

D+B Division Names Evans Plant Manager

L. G. EVANS

Appointment of L. G. (Les) Evans as plant manager of the Garland, Tex., plant of the D+B division, Emsco Derrick & Equipment Co., has been announced by W. C. Kinder, vice president. He replaces Frank L. Prosser, now retired. Evans' association with D+B began in 1940 when he became storeman and sales trainee at the company's Long Beach, Calif., store. A year later he was made sales and service engineer at Santa Maria, Calif. After serving in various departments he was made district manager at Long Beach in 1947. He was advanced to assistant sales manager of field stores for California in 1948. Evans was promoted to the position of chief engineer in August 1950, and the early part of this year was transferred to Garland in the same capacity.

Great Lakes Carbon Names Martin Vice President

Dr. S. W. Martin has been appointed vice president of Great Lakes Carbon Corp., Chicago, Ill.

Martin was general manager of the engineering and development department prior to his recent appointment.

(Continued on page 214)

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$12.00 a column inch one issue . . .
10% Discount three or more issues.

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

FOR SALE: R. L. Cardwell with GAK Waukesha, 1st class condition, $5,000. One super model Wilson single drum servicing unit, 80 hp. Waukesha, 4,000' wire, all tubing tools, mounted on GM 4-wheel drive truck. $3500. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

ONE New Haven Lathe. 12 feet six inches between centers. Hand cross feed. Two centers. One face plate. One independent chuck. Tool post. Gear changes. 24-inch swing. Excellent second-hand condition. Bernstein Bros. Pipe & Machinery Co., 175 South Santa Fe, Pueblo, Colorado. Phones 53—539.

BUCYRUS, Fort Worth, Wichita spudders. Franks, Longyear rotaries. Good used Equipment. Also tools, pipe, cable. Everything for well drilling. Fishing tools rented—Pressey & Son, Pueblo, Colo.

COMPLETE 180-KW Power Plant. 3 Natural gas engines, Prichard Tower, GE Generators, switchboards, auxiliary equipment. Running in good condition. Public Market, 311 S. Klein, Oklahoma City. 3-6356.

FOR SALE
OIL TANKER

Excellent Condition — Surveyed. Built 1945. Diesel driven. 5400 bbls. 174' x 33'-x 13'. **Marine Div., Nat'l Metal & Steel Corp. Dept. 25, Terminal Is. (Los Angeles Harbor), Calif. Ph: Los Angeles—Nevada 6-2517.**

Oil Country TUBULAR GOODS

Completely equipped, well established fabricator has production time available to convert your seamless tubing and pipe by upsetting, threading and hydrostatic testing, to A.P.I. Specifications.

Plant location is on main line railroad within the Pittsburgh switching zone.

Phone or Write
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FOR SALE
STORAGE TANKS
FOR
OIL AND GASOLINE

Welded, bolted and riveted.
Also glass lined tanks.

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EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: One String of Cable Drilling Tools complete with Casing and Derricks. Contact H. H. Blair, 600 Bitting Building, Wichita, Kansas. Telephone #7-3241.

EQUIPMENT FOR SALE

FOR SALE: Seamless casing and tubing new and second hand. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

FOR SALE: 3—STEEL SHELLS 10' x 40' Riveted, used at Refinery, in excellent condition, Reasonable, located Shreveport. A. A. Gilbert Pipe & Supply Co., Box 986.

CASING—TUBING

2500' of 7" OD, 17#, 8rd. thrd., R-2, used SS casing.

5000' of 5½" OD, 15.5#, 8rd. thrd., J-55 R-2, new SS casing.

12,000' of 4½" OD, R-2, used SS drill pipe casing, new 8rd. thrds, and new J-55 regular casing couplings, hydrostatically tested 2500#.

5,000' of 4½" OD, used SS drill pipe, beveled for welding.

4100' of 2⅞" OD, 6.50#, 8rd. thrd., EUE, R-2, used SS tubing.

12,000' of 2⅜" OD, 4.60#, 11½V thrd., 25' lengths, regular used SS tubing.

BROWN PIPE & MACHINERY CO.
P.O. Box 2368, Phone 3-9391, Corpus Christi, Texas

PIPE FOR SALE!

UNUSED STANDARD BLACK LINE PIPE:

300,000'	½" Standard Black, Plain Ends, 21' Lengths
40,000'	¾" Standard Black, Plain Ends, 21' Lengths
20,000'	1" Standard Black, Threaded & Coupled, 21' Lengths
80,000'	1¼" Standard Black, Plain Ends, 21' Lengths
60,000'	1½" Standard Black, Plain Ends, 21' Lengths
70,000'	2" Standard Black, Plain Ends, 21' Lengths
2,000'	3½" Standard Black, Plain Ends, 21' Lengths
50,000'	4" (4½" O.D.) 8.7# Welded Line Pipe, Beveled Ends, 30'-40' Lengths

UNUSED SEAMLESS STEEL TUBING, RANDOM MILL LENGTHS:

5,000'	3" O.D. x Approx. .276/.320" Wall, 8.7#
10,000'	3" O.D. x Approx. .300/.350" Wall, 9.65#
4,000'	3¾" O.D. x Approx. .375/.438" Wall, 14.5#
1,200'	6¾" O.D. x Approx. .180/.250" Wall, 15.2#

This material is excellent for welded gas or flow lines; minimum and maximum wall thicknesses available for high and low pressure work.

ACT NOW! PHONE OR WIRE COLLECT YOUR REQUIREMENTS TODAY

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EQUIPMENT FOR SALE

PIPE
ALL SIZES; LINE PIPE AND CASING. TANKS, AND OILFIELD SUPPLIES. EDCO PIPE & SUPPLY CO., PHONES 933 OR 1298. DRUMRIGHT, OKLA.

FOR SALE: Near Madison, Kansas: 1—4½" x 12" Goulds Figure 1585 Vertical Triplex Pump, Serial #37834, Gear Ratio 5.67:1, Capacity of 3360 BPD at 40 RPM, suitable for waterflood. $500.00. Cities Service Pipe Line Company, Patridge, Bartlesville, Oklahoma.

WILSON Super Winch, MZAU Engine, 57 foot double poles, on GMC 6 x 6 truck, $8,500. Wilson Super Winch, MZAU Engine, 65 foot double pole, on International 6 x 6 truck, $10,500. Both rigs complete with hooks, blocks, lines and all tools to handle rods and tubing. Excellent condition, immediate delivery. Norvell - Wilder Supply Co., P. O. Box 2178, Houston, Texas. Phone AT-3471.

"OIL and Gas Leasing on the Public Domain" by Lewis Edwin Hoffman is a text book dealing extensively with research on Federal laws, forms, regulations and practices. Available at $7 each, exclusively through F. H. Gower, 321 First Natl. Bank Bldg., Denver, Colo.

1—36-L Bucyrus - Erie Spudder, Natural gas, gasoline. Galvanized sectional house, floor, timbers, and walk. A complete string of tools for 10", 8", 6", and 5" holes, casing tools for same. Everything necessary to drill with. Box 146, Wellington, Ohio. Phone 69K.

WELL EQUIPMENT: New and used spudders, rotaries, core drills — all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools. Everything for Well Service. Pressey & Son, Pueblo, Colorado.

DRILLING Mud. Colo. Bentonite, it swells, it jells. Few equal, none better. Send for sample. Our price saves you money. Pressey & Sons, Pueblo, Colorado.

FOR SALE: 1—1947 Model GMC Diesel Tandem 65 Tulsa Winch air equipped. 20-foot body, 12" Roller, 1100 x 22 tires, is good truck in top shape. Too large for this field. McCall & Sebastian, Drumright, Oklahoma.

2—Allis-Chalmers 12" x 12" type SE centrifugal all bronze pumps, 2500 GPM, 20' head 860 RPM. Direct connected to 2—15HP Allis-Chalmers explosion proof motors, 3 phase, 60 cycle, 220 and 440 volts, 860 RPM. Newman's Inc., 700 S. Maybell, Tulsa, Oklahoma. Phone 2-5228 or L. D. 635.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

USED SEAMLESS TUBING

6000' 2⅞ OD 6.50 lb EUE 8 round range 2
3000' 2⅞ OD 6.50 lb EUE 8 V range 2

USED SEAMLESS CASING

400' 10¾ OD 40.5 lb 8 round range 2
8000' 7" OD 20 lb 8 round range 2

FRANK MORRIS & CO.
4245 S. Cheyenne, Tulsa, Oklahoma
Phone 2-6247

FOR SALE
CASING AND TUBING

40,000' #1 Used H-40, J-55 and Grade C 2⅜" O.D., 4.60# Seamless 8 R.T. & 10 V.T., R.2.
Make Us an Offer
2,500' #1 Used H-40 7" O.D., 17# Seamless 8 R.T., R.1.
Priced to Sell
4,000' #1 Used J-55 5½" O.D., 14# Seamless 8 R.T., R.2.
Several lots of 5½", 6⅝", 7" #1 Lapweld Casing
Attractively Priced

MICHIGAN CARLON PIPE CO.
20050 Livernois Ave., Detroit 21, Michigan
DIamond 1-1400

EQUIPMENT FOR SALE

FOR SALE: U-15 rotary rig in first-class condition. Has 3 NKU Waukesha motors with less than 1 year service. Without mast or drill pipe. $80,000.00. Will consider good 4000 ft. rotary as part payment. Box E-286, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: 2 rectangular steel condenser boxes or tanks, open tops. Dimensions 11'4" high X 13'4" wide X 23' and 25' long. Bottoms ⅜", sides and ends ¼" steel, 8" I-beam stiffeners. Liquid tight. Capacity approximately 25,000 gallons. Steel A-1 condition. Our price $1750.00 EACH f.o.b. railroad cars here. Harvey Brothers, Parkdale, Colorado.

FOR SALE: Two 48L Bucyrus-Erie, One 36L Bucyrus-Erie w/Cummins diesel, One RL Cardwell w/new 145 horse Waukesha. All in A-1 condition and can be seen working. With or without tools, dog house, light plants. Box 337, Farmington, N. M.

502 FEET 10-inch seamless casing, like new, 40 pound, 8 V threads. $5.00 foot. Near Tulsa. 1208 E. 20th St., Tulsa. Phone 3-9232.

FOR SALE: Pressure Tank 52" Dia. 40' long, 9/16" Shell. Riveted construction. Excellent condition. Price 06c pound, loaded truck or car. M. KAPLAN & SON, Pipe, Machinery, Supplies, Monroe, Louisiana.

2,000 FT. 12" OD used plain end line pipe, ¼". Gilbert Pipe and Supply Co., P. O. Box 986, Shreveport, La.

CASING PULLING CONTRACTORS with Hydraulic Equipment: Experienced operators—Pull any size pipe, anywhere. Also will buy wells for salvage. GENERAL CASING PULLING CO., P.O. Box 4387, Oklahoma City. Phone 6-1335.

WILSON Super Winch, 145 GKU Engine, 65 foot double pole, on Chevrolet tandem truck. Wilson Super Winch, 140 GKU Engine, 42 foot hydraulic mast, on L-10 International tandem truck. Both rigs equipped with block, hook, swivel, B.O.P., etc. Ready to work. Also two late model Chevrolet pick-up trucks. Price an application. Write W. C. Fatjo, Inc., P. O. Box 414, Lafayette, La., or call 5-6137.

990 PIECES new 1" O.D. x 16 ga. x 16' phosphorized Admiralty, immediate delivery, market price. Process Construction Co., Inc., 20700 So. Figueroa Street, Torrance, California. Phone: Pleasant 2-6366—Pleasant 1-6660.

FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole, Oklahoma.

FOR SALE OR TRADE: 954' of 5½" O.D. 13# L. W. casing—new; 3,000' of 6⅝" O.D.—13# L.W. casing—#1 used; 500' of 8⅝" O.D.—24# L.W. casing—#1 and 2 used. All above is range 1. I want new 2"—4.6# seamless tubing, preferably range 1. Prefer to trade, but will consider cash offer, subject to inspection and loading at yard near Colony, Kansas. Box E-279, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT WANTED

2-INCH UPSET TUBING new or used 8 round 10 V or 11½ thread, wrap weld or seamless. Wanted any quantity 1200' to 100,000'. Give price and location, and when can be inspected. Berryman & Humphries, P.O. 6037, Tulsa, Oklahoma.

COMPRESSORS WANTED: Will buy, lease or rent portable, unitized, skid-mounted gas engine driven compressors. Total requirement 2,500,000 cu. ft. per day of natural gas. Two to four units needed. Cable Tool Drilling Co., 1444 East Hill Street, Long Beach, Calif.

WANTED

New and Used BOLTED TYPE STEEL TANKS
Also WELDED & RIVETED STEEL TANKS in all Sizes
Also New and Used STEEL CASING, TUBING & PIPE
Will Dismantle
Will pay highest prices

Please phone or wire collect

A. GREENSPON PIPE CO., INC.
(In business over 74 yrs.)
3615 Olive St., St. Louis 8, Mo., LUcas 3651

EQUIPMENT WANTED

EQUIPMENT WANTED: One—6' x 36' to 40' x ½" to ¾" Wall x 12 to 14 tray fractionator. Describe completely with price and location. Box 978, Levelland, Texas.

COMPLETE PLANTS OR SURPLUS SECTIONS OF ENLARGED PLANTS WANTED FOR LIQUIDATION

Preferably in the following Industries:

Petroleum Refining — Gasoline Plants
Chemical — Petrochemical
Recycling Plants — Tank Farms
Pipe Lines — Utility Plants
Compressor Stations

OR SINGLE PIECES OF REFINERY EQUIPMENT

WRITE—PHONE—WIRE

Howard Kinslow

KINSLOW POWER & EQUIPMENT CO.
817 So. Boulder — Strode Building
Phone 5-5914
Tulsa 14, Oklahoma

HELP WANTED

REFINERY Office Manager and Internal Auditor for integrated Oil Company. Above average opportunity. Compensation commensurate with ability. Box E-261, The Oil and Gas Journal, Tulsa, Oklahoma.

ASSISTANT ACCOUNTING MANAGER: Opening for Assistant Accounting Manager in independent southwestern oil company. Requires college degree in accounting or equivalent experience including work in methods and procedures. Interviews for selected applicants at company's expense. Replies handled in confidence. Write Employe Relations, Box 1051, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2803, Tulsa, Okla.

TECHNICAL OIL WRITER with engineering degree and practical experience in drilling and petroleum engineering problems in Gulf Coast area. Position is in Houston and preferably the applicant should already reside there. Typing ability and writing-report preparation experience essential. Reply Box E-260, The Oil and Gas Journal, Tulsa, Oklahoma.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-264, The Oil and Gas Journal, Tulsa, Oklahoma.

MAJOR oil company has openings for graduates with engineering or physics degree with some electronics background experienced or interested in training as seismograph operator. Must be single and willing to accept foreign assignment in Venezuela, Colombia, Peru or Indonesia. Give full details of personal qualifications in first letter to P. O. Box 801, Tulsa, Oklahoma.

SERVICE MAN FOR OIL FIELD EQUIPMENT. Must have experience in Production Equipment. Top Pay, Employee Benefit. Box E-284, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN gravity-magnetic supervisor. Must be of standing in field. Top salary, subsistence, family living allowance and travel expense. Best working conditions. Our personnel has been notified. Apply Box E-262, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

AGGRESSIVE OIL EXECUTIVE — Substantial independent producing company wants aggressive, high type, responsible executive as Manager West Texas-New Mexico Division. Applicant should be under 35 years of age, 10 years experience land and geological work preferably West Texas-New Mexico area. Applicant must be equipped to find and negotiate for wildcat, undeveloped, and developed properties and leases, appraise submittals, manage present West Texas office. Excellent compensation. When replying give full details, include photograph. Our present employes not considered for this position. Box E-194, The Oil and Gas Journal, Tulsa, Oklahoma.

FIELD SUPERINTENDENT: Independent company seeks qualified petroleum engineer to take full charge of foreign wildcat operation. Responsibilities include operating one diesel rig, supervision transport and supporting activities and coordination with geophysical parties. Excellent opportunity with growing organization. Annual home leave, single quarters and living furnished. In reply give full details of experience and educational background. Reply to Box E-270, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Technician with petroleum refining background and thorough knowledge of fluid catalytic cracking operations for technical sales position. Box E-282, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL Engineer who has had actual supervisory experience in refinery or machine shop, pump, engine and turbine repair. Southwest refinery. Box E-231, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC INTERPRETER: Permanent location in Edmonton, Alberta, Canada, interpreting records of two seismograph parties for major seismograph contracting organization. Starting salary based on experience; advancement opportunity; permanent position; employes know of this ad. Those qualified by having three or more years' experience interpreting seismograph records may apply by writing Box E-249, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: One pump and engine mechanic by independent refinery, Southwest Texas. Permanent job for the right man. Please furnish experience and educational background, also a picture. Box E-293, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Engineers and Physicists with educational background in mechanical, electrical, or electronic engineering, physics or engineering physics for research and advanced development in plant and laboratory instrumentation, geophysics, physical measurements and industrial electronics. Prefer men with five to fifteen years' experience in experimental research, design and development of instruments, intricate mechanisms, electronic apparatus, optical equipment, servomechanisms and allied fields. Positions are of immediate and permanent importance to our operations. Southwestern location in medium-sized community; excellent employee benefits. Please give age, experience, and other qualifications in reply.

Personnel Director
Research and Development Dept.

PHILLIPS PETROLEUM CO.
Bartlesville, Oklahoma

HELP WANTED

MAGNETOMETER operator, foreign work. Top salary, subsistence, family living allowance, traveling expenses. Excellent conditions and climates. Our personnel has been notified. Apply Box E-263, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Branch Manager—Sales Manager and Salesman by distributor of engines and pumps in Texas. Address Box E-289, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: One instrument mechanic by independent refinery, Southwest Texas. Permanent employment for the right man. Please furnish experience and educational background, also a picture. Box E-294, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced field geologist, Oklahoma and/or Kansas area to work for independent out of Tulsa. Good future. State complete details: schooling, experience, and salary expected. Box E-278, The Oil and Gas Journal, Tulsa, Oklahoma.

RANCHES and FARM LANDS

NEW MEXICO RANCH for Sale: 3,520 acres of deeded land, State Government leases included. Total 12 sections. Lots of grass. 100 A. under irrigation. 48½ A. in alfalfa. 3 A. permanent pasture. 2,250 gallon pump well, lift water 55 ft. 500 A. or more can be put under irrigation. All fenced, and crossfenced. Good 5 room house and corrals. Electricity. 4 windmills. Plenty stock water. Will pasture 400 or more cows. If interested write J. B. Milbourn, P.O. Box 243, Estancia, New Mexico.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908 Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

FINANCING

YOUR FINANCING PROBLEM can be solved at moderate cost. For details write Box E-241, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION APPRAISAL

PRODUCTION BUYERS
Valuation Geologist experienced in checking properties for bank loans desires to represent company looking for production in Oklahoma. Box 211, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

ENGINEER WANTED

An opportunity for a responsible position in an organization with excellent prospects for expansion. For design, development and sales work on a radically new type refinery fired heater. Recent graduates considered. Refinery or heater experience helpful. Reply by letter giving experience, education and salary desired.

SELAS CORPORATION OF AMERICA
"D" St. & Erie Ave., Phila. 4, Pa.

SITUATIONS WANTED

REFINERY chemist, 27 years old, 5 years experience plant control, research, development. Presently employed as chief chemist independent oil company. Foreign offers considered. Box E-287, The Oil and Gas Journal, Tulsa, Oklahoma.

TEXAS A&M Petroleum Engineering Graduate, Registered, Age 33, 10 Years Field Experience. Reply Box E-288, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION OIL EXECUTIVES: If your days are short—it is possible that too much of your time is taken up with details that could be handled by an able assistant. I am 34 years old, family man, and well qualified for just such a job, having had 15 years experience in field and office, working direct with engineers, geologist, landmen, and executives. I have a reliable reputation throughout the oil and gas industry in public relation and technical phases. Desire to make permanent connection with reliable operator. Box E-285, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF ACCOUNTANT: Present Position proving to be a dry hole. Would you like to hit producer. What have you in proven field? Box E-292, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Gulf Coast, eight years major company experience. Presently employed. Available September 15. Box E-295, The Oil and Gas Journal, Tulsa, Oklahoma.

GAS Measurement engineer twenty-five years experience. Best of references. Box E-297, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND and Lease Man, now employed, desires change, education and experience, references. Box E-276, The Oil and Gas Journal, Tulsa, Okla.

CORROSION ENGINEER—ten years experience in the oil and gas industry desires responsible position. Will consider foreign assignment. Box E-277, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Production and Drilling Supt. on both Rotary and Cable Tools. Deep and Shallow wells, work over and completion, Material, Equipment, routine office duties. 39 years of age. Best reference. Box E-234, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROCHEMICAL superintendent, twenty years in all phases refining and petrochemicals, desires permanent position with independent refinery or petrochemical plant in south or southwest. All offers considered. Box E-257, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131 Ph No 131 Hobbs, New Mexico

EXECUTIVE ASSISTANT
PETROLEUM ENGINEER

Graduate engineer, age 36, presently employed as tool pusher on drilling rig. Eight years' sales and administrative experience and technical training. Capable assuming full responsibilities.

Box E-286, The Oil and Gas Journal, Tulsa, Oklahoma

GEOLOGIST

Desires association with established, substantial producing company in Rocky Mountain Area, Southern or Southeastern United States. Experienced in managing and directing leasing, exploration and development programs. General working knowledge engineering, reserves, valuation, contracts and submittals. Age 35. Married. Two children. 8½ years association with oil industry.

Write Box E-283, The Oil and Gas Journal, Tulsa, Okla.

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL
for
LARGE INTERNATIONAL OIL CO.

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-143, The Oil and Gas Journal, Tulsa, Oklahoma

SITUATIONS WANTED

MANAGEMENT Engineer—Foreign refining background, performance record international oil companies engineering-operating-management refineries, pipelines, terminals, Latin America, Middle East. U. S. citizen, age 37. Box E-265, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER-LAWYER: B.S., LL.B. degrees, registered engineer. Age 30. 5 years oil industry; 2½ years field experience, 3 years drilling and production equipment. Wants position engineering or legal or combination with oil company or independent. Box E-256, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT with over twenty years major company experience in all phases of production and development operations including seven years engineering desires suitable connection with progressive independent producer. Box E-275, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

PRODUCING ROYALTY: 10 acres Noble County, Oklahoma, under 320 acres. 8 months average $15 per acre per month return. Six undrilled locations. Priced for immediate sale $7500. US Associates, 619½ South LaBrea, Los Angeles

MONTANA ROYALTIES

Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225 Great Falls, Montana.

PRODUCING ROYALTIES
WANTED
ANY AREA

BERN SECURITIES CO., INC.
111 Broadway New York 6, N. Y
WOrth 4-7546

LEASE AND DRILLING BLOCKS

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, drilling propositions and small producing properties; all in shallow territory. W. F. Harley, Bowling Green, Ky.

50,000 ACRES, southwest from Jackson, Tennessee. Appraised most promising by State Geologists. Qualified driller willing to take venture after interview and inspection please write Albert Stone, The Sun, Jackson, Tennessee.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

REAGAN CO. ROYALTY from land owner under well now spudded. Will sell part out of sections 3, 4, & 11, H.E. & W.T. Survey at $80 per acre. Call John Carr, Big Lake, Texas.

INVESTORS — Competent Geological and Engineering Firm desires direct contact with investors interested in oil drilling deals. We work out geology, procure leases and supervise drilling and operation. No middlemen or brokers wanted. Best References. Write for personal interview. Boyd Petroleum Engineering Co., Box 4294, Oklahoma City, Okla.

LARGE Independent wants properties to repressure. Give full details for quick action. Box E-290, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Will purchase acreage to support wildcats in Kansas, Colorado, and Nebraska and consider drilling deals western Kansas and Julesburg Basin area. Submit details to Box E-296, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

LEASE AND DRILLING BLOCKS

IF YOU WANT honest to goodness development and have honest to goodness deal, be it proven or wildcat, write us. Box E-291, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT MEN

(Continued from page 210)

Cameron Names Three New District Managers

G. L. TEER

Cameron Iron Works, Houston, has announced three recent promotions. G. L. Teer has been made division manager of the Houston division; F. H. Isaacks has been appointed division manager of the Southwest Texas division; and M. L. Hooks has been promoted to division manager of the Rocky Mountain division.

F. H. ISAAKS

M. L. HOOKS

These men have been affiliated with Cameron for many years. Teer was formerly district sales manager in Corpus Christi; Isaacks was sales representative in New Iberia, La.; and Hooks held the same position in Casper, Wyo. Isaacks will make his headquarters in Corpus Christi and Hooks will operate out of Casper.

Sonken-Galamba Rebuilds Plant and Offices

The Sonken-Galamba Corp., severely damaged by the recent flood disaster in Kansas City, is directing operations and rehabilitation from the eleventh floor of the Pickwick Hotel in Kansas City, Mo. The entire Sonken-Galamba plant was under at least 14 ft. of water during the flood.

Sonken-Galamba's Kansas City plant is central headquarters for its divisions throughout the United States. It occupies 17 acres in the central industrial district, which facilities include a two-story modern office building, warehouses, modern laboratories for the testing and checking of aluminum alloys, fabricating plants, and railroad tracks and cranes, all damaged by the flood. All of the building facilities, laboratory, and furnace equipment are in need of repair or replacement.

In spite of the crippling effect of the flood, Sonken-Galamba is carrying on with limited production and officials expect the plant to be in full operation within 60 days. In the meantime, dealers and branch warehouses are filling orders from stock and taking over jobs Sonken-Galamba is temporarily unable to handle.

Engineering Firm Names Hooper Vice President

Andrew J. Hooper has been elected vice president of Maintenance Enginering Corp., according to C. E. Naylor, president of the company.

Hooper has been with Maintenance for 19 years, and prior to that time was assistant chief technologist at the Shell Oil Co. refinery at Houston.

Superior Iron Announces New Sales Appointments

W. A. MEAGHER

Superior Iron Works & Supply Co., Shreveport, has announced three new appointments in its sales department.

W. A. Meagher, Shreveport, who has had 11 years' experience in the supply business, joined Superior as sales representative last March.

J. D. McCammon was named to the Dallas sales department of this machine and pipe fabrication plant.

J. D. McCAMMON

J. L. MORGAN

He has been in the supply industry for 6 years.

John L. Morgan joined Superior's sales department in June. He has had 17 years' experience in the field, 10 of which were with the Ideco division of Dresser Equipment Co.

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Ensign Carburetor Expands Manufacturing Operaions

Ensign Carburetor Co. has recently acquired a new building for expansion of its manufacturing operations. In establishing plant No. 3, Ensign will concentrate in its new quarters on assembly operations, stock rooms, ordering, and shipping departments. This new plant will release considerable space in the Huntington Park and Chicago plants for further expansion of manufacturing facilities.

Duller Is Named Director

Charles E. Duller, vice president of Well Surveys, Inc., has been elected a director, in which capacity he will direct all operations of the company.

William G. Green has resigned as president and director of Well Surveys, and will devote his time to other business interests.

Well Surveys is a pioneer company in radioactivity well-logging research and development work.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 240 acres in T. 35 N., R. 84 W., 6th P.M., Wyoming, within the known geologic structure of the Pine Mountain field, undefined, will be offered for oil and gas leasing, through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, September 19, 1951, when bids will be opened. Details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to the Land and Survey Office, Cheyenne, Wyoming, or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that lots 3, 4, $NE\frac{1}{4}SW\frac{1}{4}$ sec. 31, T. 25 S., R. 37 E., N.M.P.M., New Mexico, 119.86 acres, within the known geologic structure of the Monument-Jal field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, on Sept. 19, 1951, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, at Santa Fe, New Mexico, or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that lot 5, sec. 32, T. 20 N., R. 16 W., La. M., Louisiana, 44.21 acres within the known geologic structure of the Caddo field, undefined, Louisiana, will be offered for oil and gas leasing through competitive bidding, to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, August 29, 1951, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

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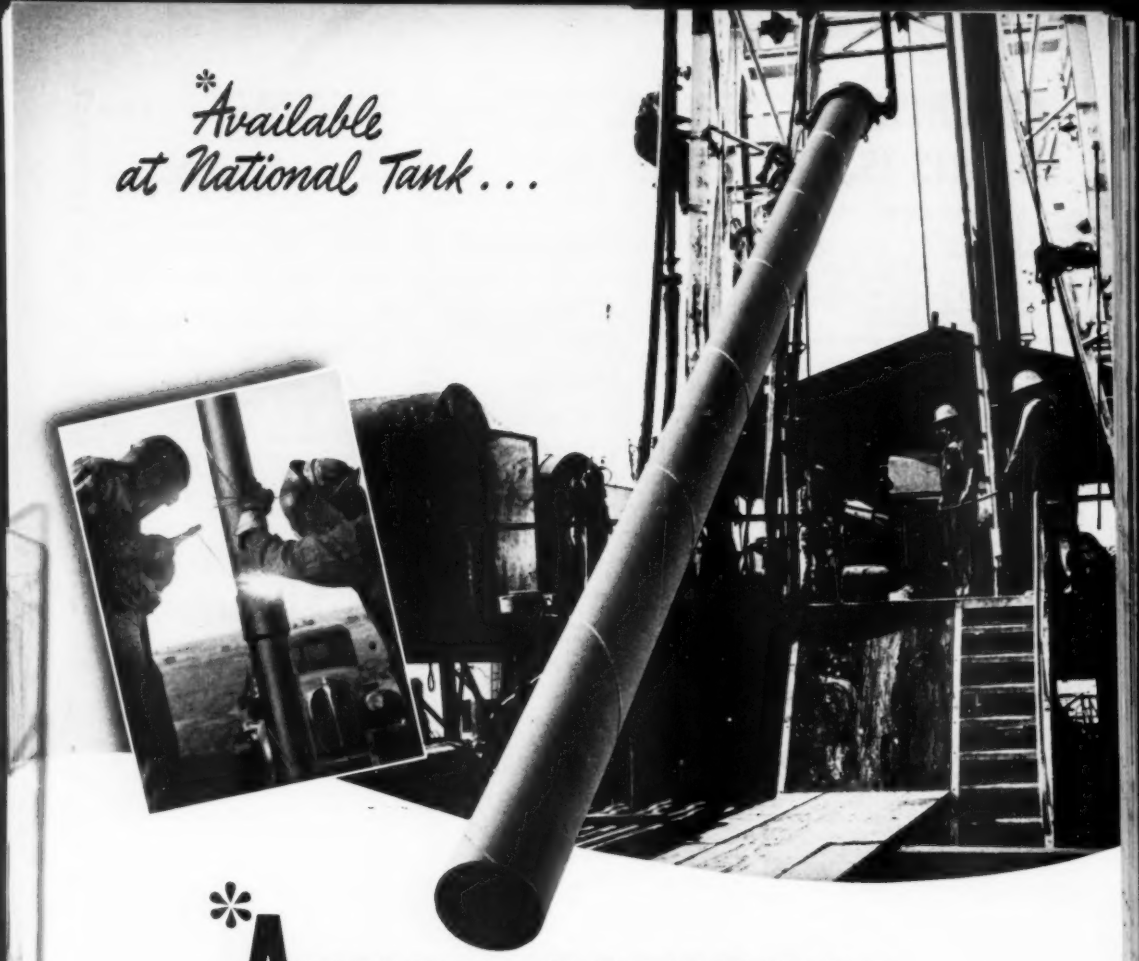
*Available at National Tank...



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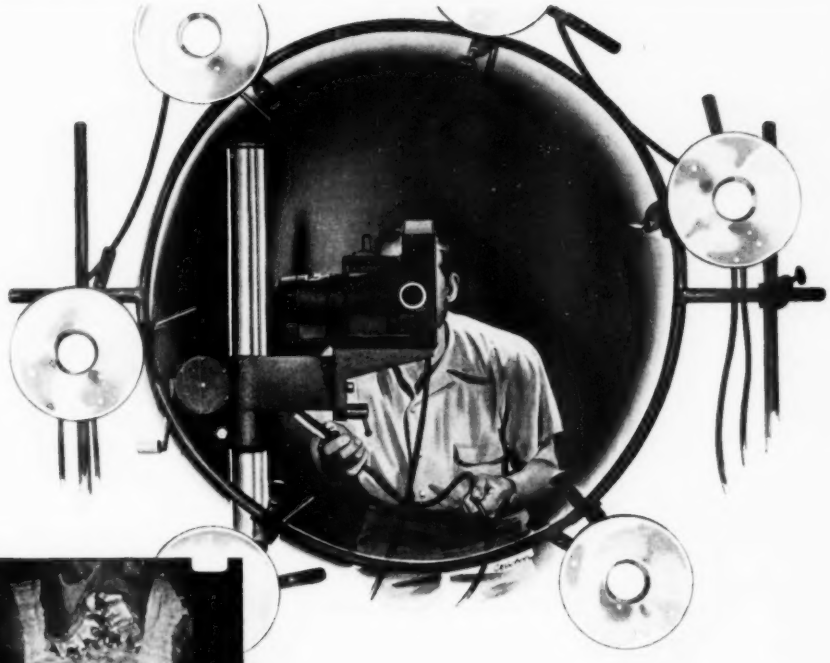

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